ANNUAL REPORTS

OF THE

FRUIT GROWERS' ASSOCIATION
FRUIT EXPERIMENT STATIONS

AND

ENTOMOLOGICAL SOCIETY

OF ONTARIO

1907

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THIRTY-NINTH ANNUAL REPORT

OF THE

Fruit Growers' Association

OF

Ontario

1907

(PUBLISHED BY THE ONTARIO DEPARTMENT OF AGRICULTURE, TORONTO).

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1908.

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TORONTO.

To the Honourable SIR WILLIAM MORTIMER CLARK, K.C.,
Lieutenant-Governor of the Province of Ontario.

MAY IT PLEASE YOUR HONOUR:

I have the pleasure to present herewith for the consideration of your Honour the Report of the Ontario Fruit Growers' Association for 1907.

Respectfully submitted,

NELSON MONTEITH,

Minister of Agriculture.

TORONTO, 1908.

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Fruit Growers' Association of Ontario.

OFFICERS FOR 1908 :

President ..... A. W. PEART, Burlington.
Vice-President ..... E. D. SMITH, Winona.
Secretary-Treasurer ..... P. W. HODGETTS, Parliament Buildings, Toronto.

DIRECTORS :

Division No. 1.—R. B. WHYTE, Ottawa.
" 2.—A. D. HARKNESS, Irena.
" 3.—F. S. WALLBRIDGE, Belleville.
" 4.—WM. RICKARD, Newcastle.
" 5.—R. W. GRIERSON, Oshawa.
" 6.—A. W. PEART, Burlington.
" 7.—E. D. SMITH, Winona.
" 8.—G. A. ROBERTSON, St. Catharines.
" 9.—J. E. JOHNSON, Simcoe.
" 10.—D. JOHNSON, Forest.
" 11.—A. E. SHERRINGTON, Walkerton.
" 12.—C. W. GURNEY, Paris.
" 13.—C. L. STEPHENS, Orillia.

Ontario Agricultural College : Prof. H. L. HUTT, Guelph.
Honorary Directors : THOS. BEALL, Lindsay ; A. M. SMITH, St. Catharines ; W. T. MACOUN, Ottawa.
Auditor : J. M. DUFF, Guelph.

REPRESENTATIVES TO FAIR BOARDS AND CONVENTIONS :

London : D. JOHNSON, Forest ; C. W. GURNEY, Paris.
Ottawa : R. B. WHYTE, Ottawa ; HAROLD JONES, Maitland.
Toronto : W. H. BUNTING, St. Catharines ; P. W. HODGETTS, Toronto.
Ontario Horticultural Exhibition : W. H. BUNTING, St. Catharines ; A. W. PEART, Burlington ; E. LICK, Oshawa ; P. W. HODGETTS, Toronto.
Michigan Horticultural Society : A. W. PEART, Burlington.
Quebec Pomological Society : HAROLD JONES, Maitland.
Western New York Horticultural Society : ROBT. THOMPSON, St. Catharines.

COMMITTEES :

Executive : President, Vice-President and Secretary, with JAS. E. JOHNSON, Simcoe, and ELMER LICK, Oshawa.
Transportation : W. H. BUNTING, St. Catharines ; J. L. HAMILTON, Clarkson ; R. W. GRIERSON, Oshawa ; E. D. SMITH, Winona ; R. J. GRAHAM, Belleville ; WM. RANDALL, Grimsby ; J. L. HILBORN, Leamington, and the Secretary.
Co-operation : JAS. E. JOHNSON, Simcoe ; ELMER LICK, Oshawa ; ROBT. THOMPSON, St. Catharines ; C. L. STEPHENS, Orillia ; A. E. SHERRINGTON, Walkerton, and D. JOHNSON, Forest.
New Fruits : Prof. H. L. HUTT, Guelph ; W. T. MACOUN, Ottawa, and E. D. SMITH, Winona.
Historical : A. MCNEILL, Ottawa ; L. WOOLVERTON, Grimsby ; HAROLD JONES, Maitland ; W. T. MACOUN, Ottawa ; W. DEMPSEY, Trenton.

Fruit Growers' Association of Ontario.

ANNUAL MEETING.

The forty-eighth annual meeting of the Fruit Growers' Association of Ontario was held in Victoria Hall, Toronto, on the 14th and 15th of November, 1907.

The Branch Associations were represented to a larger extent than usual, and the proceedings generally were of a most interesting and instructive nature. The President, Mr. Harold Jones, occupied the chair in an efficient manner.

REPORT OF EXECUTIVE FOR 1907.

Owing to the change in the Association year, by which the new Board of Directors does not meet until January, the work of the present Executive does not terminate until the end of December. This report will, therefore, cover part of the year only, the full report being presented to the new Board according to the constitution. The responsibility for the successful carrying out of the Fruit Show and the annual meeting, now rests wholly upon the present Executive and Board instead of as formerly being divided between the incoming and outgoing Board. This is one of the good features resulting from the changes in the constitution at the last annual meeting.

Membership.

The lowering of the affiliation fee for co-operative and other fruit growing associations has not brought the increase in membership that it should have done. While the total for 1907 is 537, being 103 in excess of that for 1906 (434), there are still a large number of the co-operative associations not represented. The membership of 537 is made up as follows:

Associations.

St. Catharines	110	Burlington	36
Clarkson	69	Oshawa	57
Forest	12	Belleville	35
Arkona	21	Norfolk	43
Niagara District	25	Kingsville	33
Orillia	7		

Single memberships, 124.

The Board will note that many of our strongest assiciations are thus not represented. The changes in the constitution were brought to the attention of the secretaries at least twice during the year, and they are urged to take advantage of the lower affiliation fee. In the case of one of the largest, the matter was very clearly explained to them from the Department itself, but nothing was done in the matter. The causes for this state of affairs should be thoughtfully examined, and if possible some remedy should be

devised. One explanation given is that certain districts are over-represented, while others largely interested in fruit growing have no representatives.

This question will have to be settled in the near future and the grievance removed. Great trouble at once arises in ascertaining as to the extent to which fruit growing is at present carried on in the various counties, and also as to the probable increase in orchard acreage likely to occur in the next half century or less. According to the Bureau of Industries Report, 1905, the divisions are represented in acreage as follows:—

	Bureau Reports (Apple trees only).		Census Reports 1901. (All fruit trees).
Division 1	347		335
2	321		360
3	420		345
4	972		1,080
5	1,346		1,246
6	896		1,227
7	942	Small fruits, 2,025 acres. Grapes, 3,237 acres.	2,312 (includes Wentworth)
8	631	Small fruits, 1,167 acres. Grapes, 6420 acres.	1,615
9	840		1,622
10	1,257		1,792
11	647		980
12	1,034		1,609
13	500		632

Trouble at once arises, however, from the fact that the Ontario reports give only apple trees, which tends to make them rather confusing for our purpose. A comparison with the Dominion census reports shows that the figures are reliable, except in the counties raising the tender fruits in large quantities. Here allowance must be made also for the large acreages of small fruits and grapes.

Another important point is that while some of the western counties are shown with large acreages, the orchards are old and scattered, neglected, and of course, unprofitable. Many single townships in the east produce as much saleable fruit as whole counties in the central west which may figure large in the Government reports. By thorough investigation, however, much data could be arrived at which would give a fair idea of the possibilities of the various districts. One change has been already suggested in regard to the extreme east which seems feasible. This is to divide the counties from Kingston east into two districts instead of three as at present, one embracing the counties along the Ottawa Valley and the other the St. Lawrence Valley counties, thus alloting two directors to these counties instead of three as at present. The counties of Lincoln and Wentworth could then be given one director each. This seems consistent with the extent of the industry in these counties. Further changes are shown on the accompanying map.

A further slight re-arrangement of the southern and central-western districts would seem desirable in view of the fruit conditions now known to exist there. That some changes are deemed necessary is shown by the decided action of the fruit growers in the counties of Wentworth and Halton this spring in bringing the matter to the attention of the Department of Agriculture. The re-arrangement mentioned above would give, in thousands of apple trees, Div. 1, 420; Div. 2, 474; Div. 6, 603, including 1,303 acres small fruits and grapes; Div. 7, 1,196, plus 3,959 acres small fruits and grapes; Div. 8, 1,077, plus 5,930 acres small fruits and grapes; Div. 9, 1,540; Div. 10, 1,609; Div. 11, 1,736; Div. 12, 1,593; Div. 13, 1,349.

Committees.

The standing committees present their own reports to-morrow morning. The co-operative committee has probably been the most active during the year, and through its work has assisted materially the associations already in existence. A large number of meetings were held in the spring and a few new associations were organized. It seems difficult, even in a good year such as this has been, for the orchard owners to get them sufficiently aroused to take hold of the work. As an Association we must keep hammering away in all the fruit growing counties, showing results, and coaxing the growers to wake up to their opportunities. The work is slow, and there are many difficulties to overcome before even those associations already in existence are sure of the future.

The Industrial Exhibition committee has at last been rewarded for their years of agitation for a new building. One of the finest buildings now on the grounds of the Exhibition Association was completed this year and set apart for agriculture. One wing and a portion of the main hall were reserved for fruit, and it is to be regretted that owing to the lateness of the season, the showing was such a poor one. The grapes, especially, were decidedly off color, and gave a wrong impression of this branch of fruit growing to the thousands of visitors who passed through the buildings each day.

In connection with the prize list, several further changes were recommended by your committee as follows:—

1. A fourth prize in all sections. This was granted only in boxes and barrels, commercial class.
2. Prizes made uniform for plates of fruit, except grapes, where an increase of 50c. all round was suggested. Granted in full.
3. The addition of 19 new sections in the commercial package class, chiefly display baskets. Granted in full.
4. The large collection to be allotted 3 prizes of increased value. Granted.
5. Several small changes of varieties and prizes. Granted.

Horticultural Exhibitions of 1906 and 1907.

A draft statement of last year's financial standing of the Show Committee was submitted to this Board in January. The deficit was about $900, a slight increase over that of 1905. It was pointed out then that, comparatively, the receipts were about $2,000 more than in 1905, as the expenditure, including the band, was about $2,000 greater. A full statement of the growth of the Show and the great good that was accruing from it in all its branches was carefully prepared and submitted to the Minister of Agriculture early in the session. A strong deputation representing the various industries interested presented their views on this matter, with the request that the grant to the Show be largely increased. This was favorably received by the Legislature, and a grant of $2,000 was given for this year. Part of this money was used for paying the deficit of 1906, and the present Show starts with a clean sheet and about $1,000 in cash. The city of Toronto gives $750, and the various associations interested various amounts. Your Executive has promised $300, the same amount as contributed in 1906.

This year's committee reorganized early in the summer and re-elected last year's officers with the hope that the experience gained in the last show would enable them to carry this year's exhibition to a successful conclusion.

Plans have been carefully made for the exhibits in the various branches, for music by the regimental bands of the city, and for a special hanging garden in the centre of the hall. When assembled, this year should prove the most attractive of the four held to date. If the attendance is as large as last year, a better financial statement should result, as the expenditure should be at least $1,000 less.

The one drawback to Massey Hall is that of having to divide the show between the two floors, and even then being crowded for room. Inquiry was made this summer as to the use of the St. Lawrence Market Arena, which seemed admirably suited for such a show. While the building could have been secured from the city free of charge, the cost of heating would have been so great as to preclude any idea that the committee may have had as to its use.

In regard to the fruit prize list, after consulting the Directors, it was decided to make no change until the finances of the Show should warrant our doing so, by increasing the varieties and the prizes. The entries compare favorably with those of 1906 despite the high prices which would naturally affect the entries in the commercial packages. The entries are made up as follows:—

Class 1,	Barrels, apples 50	Class 7,	Boxes, pears 29
	Boxes, apples 120	Class 8,	Plates, Grapes 25
Class 2,	Barrels, apples 33		Baskets, grapes 18
	Boxes, apples 31	Class 9,	Collections 7
Class 3,	Plates, apples 177	Class 10,	Preserves.
Class 4,	Plates, apples 177	Class 11,	Jams.
Class 5,	Pyramids, apples ... 59	Class 12,	Jellies.
Class 6,	Plates, pears 65	Class 13.	Grape juice.

In class 9, it would seem desirable to either sub-divide these sections or restrict one section to apples only. At present the southern districts are the only ones able to secure the tender fruits which go far to make the exhibits more attractive than those from the apple sections. Competition is limited to such an extent that it is extremely difficult to secure entries.

County Prize Scheme.

This work has been carried on again this year with the result that seventeen counties have entered. Seven of last year's dropped out, including Lincoln, Grey, Bruce, Kent, Ontario and Hastings; while Huron, Elgin, Wentworth and Peel came in, leaving a total of three less than in 1906. It is very difficult to get the growers in some of the best counties interested. This doubtless accounted for those dropping out. It would be too expensive to advertise in the papers in each county, and the distribution of the prize lists, together with such notices as the press will contribute voluntarily seem to be the only channels available. As a whole, this collection is one of the best in the Show, but the competition in some of the individual counties is yet poor. If some schemes could be worked out whereby the same or a better display could be procured from each county without so much cost, and perhaps doing away with the competition in each county, the same display would follow here, and the county councils might take a greater interest in them. Worthy exhibits could be awarded medals or diplomas.

American Pomological Society and 50th Anniversary.

This year's meeting is the 48th annual gathering of the Association. In 1909 we hope to fittingly celebrate our 50th anniversary. It has been brought to our attention that there would be a possibility of the American Pomological Society meeting in Canada at that time if an invitation were sent to them in advance. In this connection we would suggest that both matters be brought to the attention of the members, and, if satisfactory, a strong invitation be sent a once to their secretary, backed up by personal invitations from all those of our members who have any influence with that Society. At the same time a committee should be appointed now to make arrangements for a joint celebration.

Legislation.

In accordance with last year's resolution *re* fruit packages, which was forwarded to the Hon. Mr. Fisher, the Dominion Government finally amended the Inspection and Sale Act by stating definitely the dimensions of the 15, 11, and 6 quart baskets. Other sizes, except the berry boxes and the 2 2-5 qt. baskets, must be stamped to be legal. This should finally settle part of this vexed question. The British Columbia growers are not satisfied with the berry box, and intend to continue the agitation for further change.

In reference to the proposed nursery control law which was so thoroughly discussed last year, nothing definite was arrived at, and the Department decided that until some practicable scheme could be proposed, nothing further would be done in the matter. To give the growers as much information as possible, your Executive have asked Mr. G. A. Robertson, of St. Catharines, and Mr. E. C. Morris, of Brown's Nurseries, to discuss the subject at the convention.

Another matter partly disposed of at our last gathering, namely, that of scale infected fruit, has caused some alarm this year. The papers were full of the detention of several cars of diseased fruit a short time ago at Grimsby. At the same time a large number of cars were received at St. Catharines, Simcoe, Waterford and Delhi. Entomologists state that there is no danger of infection from scaly fruit, but the Department believes that there is no need in tempting Providence in a case of this kind. Prompt measures were taken to scald the fruit and disinfect as many cars as could be found. The Ontario San José Scale Act forbids the importation or holding of such fruit, but owing to the expressed views of many of our growers, the law has not been enforced except upon requests such as came in the Grimsby case.

A more serious matter is that of the exportation of apples marked with the scale. In some sections this year, apples have been barrelled in orchards where no attempt was made to spray, and where it was hard to find an apple free from the insect. Such fruit, if exported to Great Britain and Europe, would do more to shut us out of our markets than the highest tariff in the world.

A further revision of the San José Scale Act was made by the Legislature at the last session, as follows:—

"Upon the report of the Inspector to the council that there is scale upon the trees or shrubs on any lot within the municipality, the council may

direct that notice be given personally by the inspector, or, by being sent by registered letter, to the owner or occupant of the lot, to have the trees or shrubs forthwith sprayed; and in case the same are not sprayed within 10 days, the inspector may cause the spraying to be done, and the cost of same shall be charged on the lot and be collected as a special tax in addition to other taxes imposed by the municipal council on the lot."

This amendment was made owing to the fact that in a number of cases where municipalities and the growers residing therein were making an earnest effort to overcome the scale, some one or two parties would neglect their premises or absolutely refuse to treat the trees, proving a great menace to the neighboring premises.

Fruit Exhibitions.

Representations having been made to the Minister of Agriculture for the Province of Ontario that something should be done to hold and increase our markets for our fruits, your Secretary was delegated by the Minister to get together an exhibit for Winnipeg Industrial. As the fruit was then all in storage (November 30), the task was slow and difficult, but some seventy bushels were finally gathered and held in cold storage until July 10th. The apples were then expressed to Winnipeg and came out for exhibition in remarkably fine condition. In addition to the apples, some cherries, tomatoes, and cucumbers in the natural state, and other fruits in preservatives, made up an exhibit that Ontario might well be proud of. In cherries we were outclassed by British Columbia, but in the other fruits we were far in the lead. Many remarks were made as to our being so long in making an exhibit, and many former residents of the Province gave us a glad welcome.

TREASURER'S REPORT FOR 14 MONTHS ENDING DECEMBER 31, 1907.

Receipts.		*Expenditures.*	
Balance on hand, Dec. 31, 1907	$1,008 28	Show	$1,853 10
Fees	204 30	Horticulturist	200 50
Show	966 44	Annual meeting	504 69
Legislative grant	1,700 00	Committees	275 00
County councils	215 00	Postage	120 90
Sundries	110 59	Audit	8 00
		Salaries	70 00
		Incidentals	98 35
		Balance on hand Dec. 31, 1907	1,074 07
	$4,204 61		$4,204 61

Details of Expenditure.

(County Prizes.)

Show:

Refunds to Treasurers	(1906)	$16 70	
Prize money	(1906)	123 60	
Refunds to Treasurers	(1907)	38 15	
Prize money	(1907)	140 05	
			$318 50

Grant to show, $300; balance of prizes, $125.44		425 44
Fruit sold (1906), $193.05; (1907), $305.55		498 60
Storage and freight (1906), $56.52; (1907), $167.34		223 86
Labor (1906), $88.00; (1907), $167.50		255 50
Judges (1906), $20.20		20 20
Advertising		11 00
Express and incidental express (1906)		100 00
Total for show		$1,853 10
Horticulturist:		
Periodicals		200 50
Annual Meeting:		
Reporting, 1906 and 1907		100 00
Annual meeting, travelling expenses, 1906, P. J. Parrott, $24.05; G. N. W. Telegraph, $4.19; C. F. Hale, $28.90; G. C. Caston, $7.70; W. H. Bunting, $13.40; Forest, F. G. A., $2.30; R. B. Whyte, $20.20; Methodist Book Room, printing programmes, etc., $20.25; Wm. Rickard, $8.30; E. Morris, $7.45; H. H. Groff, $10.80; E. Lick, $6.35; A. M. Smith, $5.60; Geo. A. Gott, $2.20; A. W. Peart, $1.85; H. L. Hutt, $10.00; Jas. S. Scarff, $9.50; J. L. Hilborn, $13.45; A. D. Harkness, $15.45; C. Potter, $7.00; H. Jones, $8.00; M. Pettit, $8.45; Thos. Beall, $5.90; Oakville F. G. A., $1.10; W. H. Dempsey, $5.95.		$248 34
Travelling expenses, annual meeting, 1907, A. D. Hopkins, $13.15; R. Thompson, $10.90; F. S. Wallbridge, $3.60; W. E. A. Peer, $1.05; A. Lawrie, $4.50; M. G. Bruner, $15.35; E. Lick, $3.40; C. Fisher, $10.20; A. E. Sherrington, $3.50; Wm. Rickard, $1.85; Jas. E. Johnson, $2.90; E. Boughner, $2.90; A. D. Harkness, $9.45; A. A. Wright, $6.00; G. A. Robertson, $2.50; D. Johnson, $4.50; rent of Victoria Hall, $30.00; T. Eaton Co., decorating Victoria Hall, $10.00; Wm. Briggs, programmes, $14.00; C. Potter, $6.60		156 35
Total for annual meeting and reporting		$504 69
Committees:		
Travelling expenses (1906), Jas. Scarff, $19.50; M. Pettit, $3.20; T. S. Hill, $6.25; W. H. Bunting, $11.30		$40 25
Travelling expenses (1907), G. A. Robertson, $4.45; A. O. Telfer, $8.55; H. H. Groff, $7.70; E. Lick, $2.55; A. D. Harkness, $17.40; D. Johnson, $28.85; C. L. Stephens, $8.70; A. E. Sherrington, $20.25; A. W. Peart, $7.75; W. H. Dempsey, $15.00; A. A. Wright, $6.60; W. D. A. Ross, $7.90; Harold Jones, $23.75; Wm. Rickard, $8.10; W. H. Bunting, $67.20		234 75
Total expenses Committees		275 00
Postage and Stationery:		
Printing Score Card tags and cards, Methodist Book Room, Printing, etc., $25.75, (1906), Mrs. Hubertus, postage, $15.00; from cash, 50c.; Methodist Book Room, $8.00; (letterheads and envelopes), Mrs. Hubertus, postage, $15.00; printing, Might Directories, $7.30; Methodist Book Room (envelopes), $5.75; printing county prizes, $40.60; printing cards, $2.50; postage from cash 50c.		120 90
Audit:		
J. M. Duff, $8.00		8 00
Salaries:		
1906, A. M. Fox, $20.00; P. W. Hodgetts, $50.00 (2 months)		70 00
Incidentals:		
1906, J. Myers & Son, $1.98 (hoops); Hale Bros., $1.85; C. P. R. Telegraph, $1.25; (1907), Bank of Commerce, 15c.; expenses of advertising Hort. meetings, J. F. Goodfellow, $2.10; Ed. Thomas, $2.60; E. Brien, $8.56; L. B. Davidson, $2.45; Arthur Prain, $4.10; Orono News, $2.73; E. F. Nixon, $4.10; E. H. Bate, $1.85; Morton Co., receipt books, $38.98; J. A. Johnson, $3.10; bank collection, $1.30; sundry expenses, show week, secretary, $21.25		98.35

PRESIDENT'S ADDRESS.

By Harold Jones, Maitland.

It is a pleasure for me as presiding officer to welcome you to the forty-eighth annual convention of the Ontario Fruit Growers' Association.

Three years ago when the Horticultural Publishing Company purchased *The Canadian Horticulturist* from us, we found that our membership decreased to a large extent. The fact was that a great many became members of the Association for the sake of the journal only. Many of them were amateur horticulturists only, residents of cities and towns, and took very little or no interest in the annual reports and bulletins issued every year that are so valuable to every fruit grower. It brought us down to rock bottom, a solid foundation of a few hundred members that were all men who grew fruit—fruit growers in every sense of the word.

In spite of our seeming decrease in membership, our Association is coming into closer touch and sympathy with the fruit growers than ever before, through the co-operative fruit societies and local fruit growers' associations. These local associations are to a large extent in affiliation with our Association, receiving its benefits, and I believe the day is not very far distant when you will see every fruit grower in the Province a member.

I need hardly draw your attention to the magnificent Horticultural Exhibition this year. In the fruit department the entries are increasing, and the Province is being represented from every quarter. Our Association can feel proud of being the means of bringing together the fruits of the Province for the admiration and wonder of both Canadians and visitors from foreign countries. It is probably the greatest educative feature ever undertaken by our Association, and is bound to result in the growing of more and better fruit as well as attracting buyers from all quarters.

As an Association, we have steadily developed along the educative line, and our influence in guiding legislation is more and more recognized from year to year. We have a great future and a great responsibility before us.

I would direct your attention to the report of the Secretary for particulars of the work done during the year. I am sure we all recognize with grateful acknowledgements the generous aid given by the Department of Agriculture of the Province in carrying on the educative work, and particularly would I mention our able Secretary, Mr. P. W. Hodgetts, in conducting the horticultural exhibit at the Winnipeg Industrial last July, when he was able to demonstrate to the people of our great Northwest that our fruit could hold its own against all comers.

Mr. G. A. Putnam also gave valuable aid to the Association by arranging the 45 meetings held over the Province. Messrs. A. E. Sherrington, D. Johnson, and W. D. A. Ross proved enthusiastic and energetic workers in organizing societies and deserve much praise for the results obtained.

Our Association fully appreciates the valuable information furnished by the Fruit Division at Ottawa in the monthly reports on fruit and market conditions, and wishes to convey its sincere thanks to the Hon. Sydney Fisher for the able assistance furnished in organizing associations. I am sure that our Association recognizes the great good that has resulted from the Dominion Fruit Conference held at Ottawa in March, 1906. It has resulted in strengthening our position, and gained the confidence of the world's markets.

There are possibly yet some weak points in the Fruit Marks Act that might be remedied. At a meeting of the Glasgow Provision and Fruit

Trades Association, held in Glasgow last August, Mr. Barrow, President of the Fruit Trades Association, in the course of a few remarks complained of the high freights from Montreal, and in the case of barrels of apples found to be falsely packed, he thought they should be repacked before being allowed to go forward. I suggest that you consider the question of having another conference, and, if you think it advisable, to ask the Minister of Agriculture for the Dominion to call a meeting at an early date.

At the recent meeting of the American Pomological Society held at Jamestown, Virginia, Prof. Macoun found there was a strong desire on the part of many of the prominent members of the Society to hold their next meeting in Canada. The next meeting will be held in about two years. I am sure your Society will see the importance of having such a strong society as this holding a convention in Canada, where Canadian and American fruit growers could discuss together the many important matters common to both. I would ask you to consider the matter, and suggest that you send a formal invitation from your society to the President of the American Pomological Society, bearing in mind the importance of selecting a place of meeting where ample hotel accommodation could be secured.

It is through your association, with the hearty co-operation and assistance of the Department of Agriculture, that the several experimental fruit stations have been able to do so much good in the way of determining the value of different fruits to the several sections or zones of the country. The work in the past has been mainly along testing known varieties; with the advent of an experiment station such as is being organized at Jordan Harbor, the time has arrived when careful and scientific research should be undertaken to produce the ideal or perfect fruit.

Our country is new as countries go, and although we have made great progress during the last few years along horticultural lines, we must remember we have a great future before us, and must live up to our opportunities and obligations.

As retiring president for the year, I bid every fruit grower welcome to our annual meeting, and hope you will attend all its sessions, join in the discussions, and work with a will to make our Association the grandest on the continent.

The PRESIDENT: With regard to the visit of the American Pomological Association, the question as to where their next meeting should be held came up, as I said, while I was at Jamestown, and invited them to hold their next convention at St. Catharines in the month of September. There is ample accommodation, and it is in the centre of the finest fruit section of the Province. It will be necessary for the Association to extend them a formal invitation to meet here at their next gathering, two years from last September. I have much pleasure, therefore, in moving a resolution to that effect.

Mr. W. T. MACOUN, Ottawa: The holding of such a convention here would be of great good to Canada, as many fruit growers in the United States have little idea of the present status of Canadian horticulture. It is just possible that the Nova Scotia Association may also invite them. I do not know what the hotel accommodation of St. Catharines is, but the President of the Association informed me that they would go to no place where they could not all be given accommodation in one hotel. There would probably be one hundred members present. They have a wide representation from all over the country, and I suppose eighty per cent. are horticulturists and officers of the experiment stations of the United States.

Prof. Hutt: Hamilton would be a more central place, and has the hotel accommodation, but they have not such good horticultural organization. I have pleasure in seconding the resolution.

The Chairman put the resolution to the meeting, and declared the same carried.

Mr. W. Armstrong, Queenston: With regard to the Advisory Board for the Station at Jordan, I think that the Board should consist of specialists for each of the fruits.

The Chairman: Perhaps you would present that suggestion to the Minister whom we expect to have with us this evening. I think it is a very good point indeed.

COMMITTEES.

The following committees were then appointed by the chair:

Resolutions: R. B. Whyte, Ottawa; M. Pettit, Winona; E. Lick, Oshawa; Alex McNeill, Ottawa.

Nominations: E. Lick, M. Pettit, W. H. Dempsey, A. E. Sherrington, G. A. Robertson.

NEW FRUITS.

By W. T. Macoun, Horticulturist, Central Experimental Farm, Ottawa.

In the early part of the nineteenth century, eighty per cent. of the apples then advertised by the nurserymen were of purely European origin; now scarcely ten per cent. are of European origin. This means that, during the past one hundred years, Americans have found out that fruits originated in the United States are better suited to their conditions than those that are imported. The result is that the European varieties are gradually passing out. When settlement began in this Province, the nearest source of supply for fruit trees was the United States. For that reason nearly all our varieties are of American origin, such as Greening, King, Spy, Ben Davis and Baldwin. Are we to conclude from this that the United States is the only place that can produce good apples? I do not think so. Our experience is that apples originated in this country are just as good as those originated in the United States. In Eastern Ontario, the growers tried all the American kinds with failure as the result in most cases. The result has been that there has been developed there apples of Canadian origin, such as St. Lawrence, McIntosh Red, Fameuse, and Baxter, which we need not fear to compare with apples from any other part of the country. There is no reason why Western Ontario should not originate apples of just as high quality as those of Eastern Ontario; but apples of American origin have done so well that up to the present there has seemed no pressing demand for anything else.

You will see, therefore, that there is a great future for the development of Canadian fruits. Plant breeding is one of the most popular subjects for investigation on this continent at the present time. Three-quarters of the Experiment stations are now engaged in this work, and perhaps half are breedings fruits that will be suited in a greater or less degree to the different parts of the country. Hundreds of varieties of fruits will in this way

be brought into notice in a few years, and the confusion that results from growing so many varieties promises to be far greater in the future than in the past, and something must be done to prevent such a state of affairs being brought about. The question for this Association to take up is, how can we test in the interest of commercial fruit culture the best of these varieties, and yet save the country from that condition where hundreds of varieties will be grown by fruit growers, thus injuring the export trade of the country? I think that the Association can do a great deal towards the desired end by developing the co-operative movement in the direction of buying large numbers of trees of few varieties, so that in each section those interested can arrange to buy in large quantities of a few kinds. There will then always be sufficient fruit of one variety to make up car load lots.

During the past year very few samples of fruit have been sent to us at Ottawa.

I should like to continue the remarks I made last year as to the work we are trying to do in the breeding of new apples. We have now over two thousand seedlings growing at Ottawa of apples that have been produced there. Of these about 200 have fruited, and fully 25 per cent. of these are varieties which we cannot discard at once, as we believe they may be useful in different parts of the country. Canada is a very large country, so that we have a vast territory to consider. If we get that percentage in 200, how many varieties shall we have by the time the whole 2,000 trees have fruited? Our future plan of work will be to plant orchards of the best ones, so that we may cull them out, and bring to notice only the very best.

As an example, I should like to draw attention to 23 seedlings of the Swayzie Pomme Grise, a variety of very good quality which, I believe, originated in Canada. The following statement of their characteristics will convey an idea of how much they vary:

Of the 23 seedlings under discussion only two resemble the Swayzie very much, although a large proportion of them have distinct Swayzie characteristics, one of the strongest being the crisp, breaking character of the flesh and the sprightly aromatic flavor.

The Swayzie, as was stated averages below medium in size, being sometimes medium, but oftener small. Of the 23 seedlings described, 2 are small, 12 medium, 4 above medium, and 5 large. In shape, the Swayzie is oblate to roundish. 14 of the seedlings are oblate, 6 roundish, 1 conical and 2 oblong. The Swayzie is a russeted apple. Of the 23 seedlings 2 are more or less russeted, but only 2 are much russeted. The Swayzie is sub-acid, but sprightly; of the seedlings 3 are acid, 8 briskly sub-acid, 11 sub-acid, and 1 sweet. The quality of Swayzie is very good to best; 8 of the seedlings are good to very good, 11 above medium to good, and 7 of only medium quality. The season of Swayzie is mid-winter. Of the seedlings 2 are August apples, 8 September, 5 October, 4 early winter, and 4 winter; thus 15 are summer and fall apples, and 8 winter, but this proportion will probably change as more seedlings fruit, as our experience is that trees of winter apples usually fruit later than those of earlier season.

Our intention is to prepare a report on these and place on record their true merits, which is one of the chief objects of this committee.

I am fully in accord with the President's suggestion that something should be done to unite the efforts that are being made at Ottawa with those at the Jordan Station in regard to the originating of new varieties. We have originated an apple called "Ottawa," which we believe is the best of those originated at the Central Experimental Farm. We believed it to be the future winter apple for the Province of Quebec, but it killed to the

ground last winter, fortunately not before it had been propagated. I consider it promising even for Western Ontario. Mr. Ed. Morris said that it was the most promising he had seen for years. If we would send such apples to the Jordan Station, their merits could be tested for Western Ontario. I have also a large number of seedling grapes of the later kinds, which might prove very valuable in Western Ontario.

Prof. HUTT: I agree with Mr. Macoun that one of the chief objects of our work is to keep a record of these new varieties that come up from time to time and give an impartial verdict on them. We shall have, as he has said, an increasing number of new varieties to deal with, as so many are going into plant breeding, and there is a great necessity for some impartial tribunal that can pass upon them before they are put before the public.

In dealing with the new fruits that are submitted to me, I try to find out first whether they are really worthy of reproduction. If they are, we bring them before this meeting; and if they are considered promising, we get scions and test them, so that we may not lose sight of any promising variety that may be originated. Some parts of the Province are in need of a class of apples that is not yet available. In the northern part of the Province for example, they have summer and fall apples, but no winter variety like we have in the southern sections. The Wealthy becomes almost a winter apple in the north, but they want a longer keeping apple, and our Committee must be on the look-out for something of that kind.

REPORT ON NEW AND SEEDLING FRUITS.

By Prof. H. L. Hutt, Ont. Agricultural College, Guelph.

Comparatively few seedling fruits have been sent in this year for examination, but among the few is one which I believe to be the most promising seedling which has yet come before my notice.

No. 1. The first is a seedling from Swayzie received from Prof. Macoun, Ottawa, and by him named the "Ottawa." This apple does not in any way resemble the Swayzie, but instead very closely resembles Ben Davis in shape and general appearance. It is fine-grained, juicy, mild sub-acid, but I consider it of only fair quality. Prof. Macoun, however, considers it the most promising seedling they have yet raised, because of its good keeping quality. It may be valuable where a hardy winter apple is required, but would not, I judge, be of value where better varieties can be grown.

No. 2. A seedling sweet apple grown by Mr. William Moore, of Mansewood, Halton County. This is a bright red apple, medium in size and oblate in form, something of the size and appearance of Wagener. It is, however, of particularly fine quality. Mr. E. Morris, to whom I sent samples, declared "It was very much superior to Tolman, having a pleasing sweet flavor." It is a good keeper and of about the same season as Tolman. Mr. Moore reports that the tree is a vigorous grower, came into bearing early, and has been very productive.

There is not a great demand for sweet apples, but this apple is worthy of propagation because of its extra fine quality for home use.

No. 3. On the 2nd of April, of this year I received a box containing a dozen specimens of apples from Mr. Isaac Pike, Bethesda, Ont. They were

large, handsome specimens, in excellent condition, about the size and shape of Northern Spy, but of solid, bright red color; in fact, the handsomest specimens I have seen for a long time. Mr. Pike explained that he had some years ago planted thirty seedling trees for the purpose of grafting, but two of the trees had such handsome foliage that he decided not to graft them, and these two trees have borne the specimens sent in. Upon inquiry as to how the two seedlings came to be bearing the same fruit, he explained that when he received these trees they were on the same root, but as he was able to divide them he made two trees of the one, hence both trees were of the same variety. The trees came into bearing early and proved hardy and productive. He says the fruit will hang on unusually well in fall without being blown off, and for this reason he allows them to hang until they obtain their beautiful color. It is excellent quality and a good keeper, keeping in fine condition until May. Mr. E. Morris, to whom I sent specimens, says, "This apple is certainly worth propagating. Its large handsome appearance and good keeping qualities would certainly make it a valuable acquisition."

Mr. MACOUN: With regard to the "Pike" apple, we have had it at Ottawa, and I do not think it is a seedling at all, but some old named variety, although which one, I have been unable definitely to ascertain. I have had specimens of apples from the Eastern Townships called "Kinkead," which I believe are identical with it. Descriptions I made of the two apples in differ- years read almost identical.

SEEDLING APPLE FROM PIKE, ISAAC, BETHESDA, ONT.—AKIN.

Fruit: Size, large; form, oblate, conic; cavity, deep, open, russeted; stem, medium length, stout; basin, narrow, rather deep, smooth; caylx, open; colour, yellow almost entirely washed with crimson; dots, moderate numerous, yellow distinct; skin, moderate thick, tender; flesh, dull white or yellow, juicy, tender, crisp; core, medium; flavour, sprightly, sub-acid, pleasant, somewhat like Spy; quality, very good; season, evidently mid to late winter.

General Notes: A handsome apple and very promising. Resembles Kinkead much. Specimens received from Prof. H. L. Hutt, O.A.C., Guelph, Ont.

Described by W. T. M. Date, April 9, 1907.

Division of Horticulture,
Central Experimental Farm, Ottawa.

KINKEAD—AKIN.

Fruit: Size, above medium; form, oblate to roundish conic; cavity, open, deep, russeted near base; stem, medium slender; basin, deep, medium width, almost smooth; calyx, open; colour, yellow, almost entirely overspread with rich, attractive crimson; dots, few, yellow, distinct; skin, moderately tender; flesh, yellowish, crisp, tender; core, medium, open; flavour, subacid, sprightly, good; quality, very good; season, probably early to mid-winter or later.

General Notes: A fine dessert apple, handsome in appearance and very good in quality; tastes very much like Spy.

Specimens received from Asa. Johnstone, East Farnham, P.Q.

Described by W. T. M. Date, December 22, 1906.

Division of Horticulture,
Central Experimental Farm, Ottawa.

NOTE.—Since the date of the meeting the Pike Seedling has been identified by Col. Brakett, Pomologist, Department of Agriculture Washington, as the Akin. Following are independent descriptions of the apple under different names:

REPORT OF CO-OPERATIVE COMMITTEE.

By A. E. Sherrington, Walkerton.

Your Committee beg leave to report as follows:—

The committee held two meetings during the present year, the first on March 5th, and the second on June 11th. At the first meeting various methods of carrying on the work of co-operation were discussed. It was decided that we should again co-operate with the Ontario and Dominion Departments of Agriculture in holding a large number of fruit institute meetings, when the benefits of co-operation could be brought before the growers. Your Committee desires to express their appreciation for the help that the Dominion Department has rendered to us by sending their Inspectors to assist at the fruit meetings, and we trust that they may continue to give us their aid.

At the first meeting in March, the subject of bookkeeping for the associations was discussed, and a committee was appointed to work out a uniform system of bookkeeping for the associations. A great deal of information was obtained from the associations and otherwise on the subject, and at the June meeting it was definitely arranged to get out a set of counter check books on a uniform plan for as many of the associations as wished to avail themselves of them. Ten associations adopted these books, but owing to rush of work at the factory, there was some delay in getting them out.

The Committee also discussed getting out other books for the associations, but nothing definite was done. Your Committee trust that they may be able to work out some feasible scheme for another year.

A number of resolutions were passed relating to the industry generally. During March, April, and June some sixty fruit institute meetings were held. They were addressed by D. Johnson, Mr. Gifford, Mr. Cary, Mr. Baker, your servant, and a number of other fruit growers. In the majority of cases these meetings were will attended, and a great deal of interest was taken in co-operation and the industry generally. As a result, a large number of co-operative associations were formed. We have now something over forty in operation, and, so far as I am aware, they are all making a success of it. But your Committee finds that there is a great deal of work to be done yet to bring the co-operative movement to perfection. Co-operation has taken hold of the people of America. It is only a week or two ago since we were favored with a visit from a gentleman from Cornell, New York, to study the co-operative system of Ontario. He expressed himself as much surprised to see that such a young province as Ontario was so far advanced in methods of handling the products of the orchards over such old states as New York. He said it spoke volumes for the enterprise of the growers. Within the last few days I have had a letter from a gentlemen who wishes to have an opportunity of laying before the associations a plan for the consolidating of the associations; and with that end in view, a meeting will be held in the near future, perhaps during December, or early in January, to hear his suggestions.

Mr. Macoun: What are your views in reference to the co-operative buying of trees?

Mr. Sherrington: I am very much in favor of it. This was one of the points I brought out at our meetings this year. The Oshawa Association bought on the co-operative plan. I believe that is one of the ways by which we can get the right varieties into a district. It might be a good plan to establish a small nursery in each district under the control of the co-operative

association. There is a small nursery at Newcastle, and I advised the local growers to patronize it, and induce the nurserymen to grow only such varieties as are suitable for the district and to enlarge his nursery. The number of varieties is a menace to our industry.

No doubt most of you are aware that we have a central association as well. We did good work there, but are hampered for funds, and for lack of money we cannot extend the work as we should like. We must appeal again to the good will of this Association and to the growers to assist us financially; it is necessary.

Q.—Do associations as a rule adopt uniform bylaws and constitutions?

A.—Yes, we provide a set of bylaws and rules as a guide.

This year we had a very serious shortage of cars, and those associations that have not a storehouse, will, I am afraid, meet with loss, and thus do harm to the movement. We find that associations that have a storage building and packing-house are a much greater success than those that are merely mutual associations and do the packing in the orchard.

R. Thompson, St. Catharines: Could not something be done to supply better information as to prices?

E. Lick, Oshawa: This work is such a very broad work, and one of so much detail that it is a question where to start and where to end. Mr. Sherrington brought up the matter of co-operation between the associations themselves. It would be a very desirable thing, but I do not think we are ready for it yet. It may be as hard to get the asociations to co-operate as it was to get the farmers to co-operate. We had better go slowly rather than rapidly, and be sure we are going ahead.

As has been stated, there is this year a strong probability of injury from frost owing to the car shortage. Apples in our section are left lying around for ten days or two weeks or longer before they can be shipped. This seems to point to the necessity of co-operation of all shippers, whether they are dealers or not.

There are two or three things that are of prominent importance, first, that our co-operative associations should get in a little closer touch with one another; second, that we get a more accurate system of books which can be generally adopted; the third thing is to work for the extension of the number of associations.

REPORT OF THE TRANSPORTATION COMMITTEE.

By W. H. Bunting, St. Catharines.

The results of the work of the committee are of the greatest importance to the fruit growing industry. We may adopt the best methods of production, take all the pains we can to prepare our fruits in good condition for the market, but unless we can place them there cheaply and promptly, our efforts will be practically nullified.

Some four years ago when I, with some other gentlemen, had the honor to represent this Association before the Railway Commission, which had just been appointed, we laid before that body a statement of the ever-pressing grievances under which it was felt the industry labored. We accomplished several things at that time; first, we succeeded in drawing public attention to the importance of the fruit trade more fully than ever before. In addi-

tion to that, the delegation was able to present in a concrete form some of the more pressing necessities of the trade. These complaints were received by the Commission with a great deal of interest, and it was practically admitted by the railway companies of this country that the statements made were correct and that conditions should be remedied. Some effort was made to remedy these difficulties, and at the present time, some branches of the fruit trade are reaping the benefit of these improvements; but not all.

Some of the things laid before the Commission were so far-reaching in their nature that it required time, and will require, perhaps, a little more time, and more pressure and more enthusiasm, not only of the committee but of the rank and file of the fruit growers, to succeed in accomplishing what is desired.

The question of the equipment of our railways for the transportation of fruit was one of the points at issue. The companies practically admitted that their equipment was insufficient, but they claimed that the abnormally large traffic of this country during the past few years has been of such a nature that they have been entirely unable to keep up with requirements. A few years ago the traffic officers of our two railways admitted that the service had almost broken down so far as the rapid and efficient transportation of fruit was concerned.

In passing, I wish to say that I think you are to be congratulated on having shared in the effort made some years ago, in connection with other agricultural organizations in the Province and Dominion, in having the Railway Commission established. If we owe a debt of gratitude to one man more than another in connection with this matter, it is to our friend W. L. Smith, who in season and out of season was active in pushing in every way he possibly could for the appointment of this Commission. It is due him that these remarks should be made.

Your committee has not been altogether idle during the past year. While we have not accomplished very much, the question of express matters has, since the express companies were placed under the control of the Commission, engaged our attention to some extent. It has been felt that the interests of the trade, more particularly for tender fruits, were of such a nature that a vast improvement was necessary in connection with the express business of the Dominion. The committee has been endeavoring to assemble some data and make preparations for an interview with the Commission at an early date. We find it very difficult, however, to get from the grower definite data on which to work. I do not know whether it is because some feel that they may be discriminated against in their dealings with the transportation companies, but for some reason they hesitate to give particulars, as to grievances that they are quite ready to speak of in a general way. Your committee does not know everything, and cannot find out these things without your assistance, and on behalf of that committee I ask every person here, whenever you have a definite transportation grievance, to forward particulars to the president or secretary of the Association. If you desire it, your name will be held in confidence, but we would much rather you came out frankly and plainly over your own signature in such matters.

I believe that the companies are anxious to give better service, but there are certain limitations that tie them up to some extent; but if we could impress upon them the importance and necessity of this work more fully than in the past, I have no doubt we should get, through the Commission, a very great amelioration of present conditions.

The difficulty of obtaining cars has been mentioned. This has been felt over a large portion of the Province. I am glad to say that, as a result of an

interview last week before the Commission, the matter is being investigated, and I have no doubt that all possible pressure will be brought to bear on the railway companies by the Commission to have the condition remedied.

Last week, in addition to this, there were several other matters brought before the Commission under the direction of Mr. Graham, of Belleville, and E. D. Smith, of Winona, who made formal complaint. They requested a stopping privilege at divisional points for the purpose of inspecting grading, and sorting carloads of apples. This would enable shippers, and particularly co-operative associations, to assemble cars at a divisional point, sort them, and for a small additional charge, send them on to their destination. It has been asked to make this apply to our North-west business.

Request has also been presented for properly heated cars during the winter season, and a sufficient number of icing stations at different points for the summer traffic; also accommodation for receiving perishable products.

The Act is explicit that railways must transport commodities with due diligence. The question was asked of the Chairman, what would be a reasonable time in which to expect a car? He considered that a reasonable time would be six weeks.

We have also asked the Commission to fix the responsiblity for damage and loss because of failure of railway companies to provide proper accommodation and transportation facilities, and for loss caused by delay. We endeavored to impress on the Commission the absolute necessity for some definite, sure and speedy method of arriving at the damages, and securing same, where they were occasioned in that way. It seems to me that this is one of the crucial points in dealing with transportation grievances. If we can succeed in fixing the responsibility, we shall, I think, have solved the difficulty of service and equipment. As soon as the companies find that they are liable for damages, I believe they will realize that it is up to them to provide facilities and avoid as much of this delay and annoyance as they possibly can.

At the present time the Commission has the express business under consideration, and, as I said, your committee have been endeavoring to secure data in reference to the matter, and will be glad to have from any of the members anything they may have to offer bearing on the question.

THE ONTARIO HORTICULTURAL EXPERIMENT STATION—PROGRESS OF THE YEAR.

By H. S. Peart, Director, Jordon Harbor.

Most of you are aware of the circumstances under which this station was secured by the Government, Mr. M. F. Rittenhouse, of Chicago, having donated the property. It is situated on the township line between Louth and Clinton in Lincoln County, on the lake shore, 11 miles west of St. Catharines, and six miles east of Beamsville, and contains 90 acres extending south ¼ of a mile from the lake front, being about 1,200 feet wide. The soil varies greatly. At the southern end there is a block of light sand with heavy clay subsoil at a depth of eighteen inches to three feet. To the north of that there is a ravine running through the property, where there is heavy black soil, but not one that is at all retentive of moisture, being easily drained by a natural water course. Up this ravine on either side we have

some land that is rather broken—part sand, part gravel and part loam—three or four acres altogether. There is a belt running diagonally across the farm, consisting of 20 to 25 acres of rather heavy red clay. Beyond that we have clay loam and a considerable block of sandy soil. Clay subsoil underlies the whole at a depth varying from eighteen inches to the red clay that appears right at the surface.

When I went to the Station in June, the wood lot had been cleaned up ready for some work in forestry, and practically all the land that had been cleaned up last season was sown with oats and seeded with red clover. Near the Rittenhouse public school on the southeast corner of the farm nothing had been sown, and there I conducted some vegetable tests.

The first work undertaken was underdraining. Mr. W. H. Day of the Department of Physics of the Ontario Agricultural College, made a complete survey of the whole farm, drawing plans for the drainage system, and a complete system of drainage was undertaken. We have since laid about 10½ miles of tile drain, and practically the whole farm is underdrained.

Since we commenced this work, I understand from the people living in the vicinity, that there has been more tile draining done this year in the neighborhood than in all previous years put together, so much for the influence of example. The work of draining occupied about ten weeks. At the start we used a subsoil plow, but found it too weak for the work. we tried one or two ditching machines, but they failed to work where there was any stone present. We then took a Verity pavement plow, which, with some changes we adapted to the work, and found that with four horses we could loosen the earth as fast as forty men could throw it up. We asked for tenders for the work of putting in drains, but found that we could put the tile in the ground and cover it for three-quarters of the sum named in the lowest tender for ditching alone.

After concluding the drainage, we laid out one or two service roads and divided the farm into blocks according to soil. The farm is now in very good shape to lay out in whatever way may be deemed advisable another season.

At the north end of the farm on the lake, there is an apple orchard of about eight acres, consisting of what are generally looked upon as standard varieties of winter apples. These trees are 20 to 25 years old, and are in fairly thrifty condition, although the orchard has been in sod for some little time. In this orchard I commenced a test of cultural methods. One-third of the orchard was plowed last autumn, one-third spring plowed, and the balance is still in sod. Even this year, which was a very trying one, the trees in sod appeared sickly compared to the others.

The lake road along the front of the farm is crooked and in many places very narrow, owing to the continual breaking down of the lake bank. A reservation of 66 feet along the shore was made to improve this road, and $19.00 was expended on it, irrespective of culverts. In an effort to preserve the lake bank, we are constructing a number of concrete groynes which will be toppled over the bank and used as breakwaters. Between these it is believed that the sand will build up and thus form a beach. I am unable at the present time to furnish any data as to the vegetable tests near the school. I believe, however, that we have soil there on which we shall be able to conduct tests with all kinds of vegetables and all kinds of fruits. Vegetable growing is coming into prominence in the district, and we hope to be able to do valuable work in this direction, both for the people of that district and of Essex as well.

I should like also to refer to the work Mr. Rittenhouse has done during the past year. At the base of the town line is a little grove of which he intends to make a picnic ground for the use of visitors. When the work is completed it will add very much to the appearance of the neighborhood. The town line is to be macadamized for three or four miles; three-quarters of a mile has been done this year, and a handsome concrete bridge is now being completed over the stream that runs through our land and crosses the roadway at this point. The road and bridge work is being done under the direction of the Public Works Department.

Mr. SHERRINGTON: While Mr. Peart was speaking the thought came to me, of what value is this Station to be to the Province in general? No doubt it will be of great value to the southern district, but I cannot see what use it will be to the northern counties or the northern districts, where fruit of certain varieties can be grown with perfect success. Fruits that may be perfectly successful in that district may be a complete failure over the Province as a whole. How are we to go about it so as to make this Station useful to the whole community? I am glad to learn that it proposed to co-operate with the Experimental Farm at Ottawa, and to test at Jordan varieties grown at Ottawa and *vice versa*. That will be going from one extreme, I was going to say, to another extreme. I think the move is in the right direction; but aside from that, I think that some of the district experiment stations could be made good use of in this way. I understand, however, it is the intention to do away with the local stations. It is not likely that the Station at Jordan can do good work in connection with new varieties of hardier plums, cherries and apples.

With regard to new varieties, I am strongly of the opinion that it is inadvisable to send out any new varieties either from Ottawa, Jordan or elsewhere, unless they are superior to, or equally as good as the old standard varieties, or will cover a portion of the season for which no varieties at present exist. A good work can be done at the Station in the direction of producing new varieties by crossing. If we could get by this means an apple equal in quality and productiveness to the Spy which would come into bearing a little earlier and carry better to the western market, it would be a great benefit to all concerned. The varieties thus originated should be thoroughly tested at the local stations before they are sent out to the nurseries, as varieties that will succeed in one district may not in another where soil and climate are different. But do not multiply varieties unless you are certain that they are superior to our standard varieties. In Western Ontario it is almost impossible to load a car of apples without getting 15 to 25 varieties in a car; therefore, I speak strongly on this point.

Mr. MURRAY PETTIT, Winona: When the deputation went before the Government to urge upon them the importance of establishing a station of this kind, the principal argument was that the farms at Ottawa and at Guelph were unable, owing to climatic conditions, to experiment with the more tender varieties of fruits, as they should, to be of benefit to Southern Ontario, where the bulk of the tender fruits are grown. I agree with Mr. Sherrington that we do not want to multiply varieties; there are too many now. But if, by proper hybridizing, the management of this Station can produce one peach with the productiveness, hardiness, and size of the Elberta, and the flavor and color of the Crawford, and the earliness of the Triumph, the whole expenditure on the Station will be well repaid. The Northwest is our great coming market, especially for tender fruits. If we had a peach of that description that could be laid down earlier on that market, and in that way lengthen the peach shipping season to that

market, and also compete with California growers, it would be of immense value to the Province.

The same thing applies to plums. If we had a plum as productive and hardy and of as good quality as the Lombard, with the shipping qualities of the Monarch, and as early as some of the Japanese, it would drive a lot of valueless plums out of the market and be of great value to the Province.

The same thing applies to grapes. If we had as good a grape as Concord, suited to all soils and localities, and as early as Champion, and as good a shipper as Rogers, it would be of immense value; it would prolong our season in the Northwest very much, and at a season of the year when the weather is warm and there is a better demand for grapes.

In my opinion there are thousands of dollars thrown away annually by fruit growers in the use of fertilizers. They use fertilizers on their orchard. If the season is favorable and they get a good crop, it is the fertilizer that does it. Fertilizer tests might be conducted at the Station with great advantage.

There is room, too for favorable experiments in pruning. Take the different heights, for example, at which peach trees are headed. In my opinion the short-trunked peach tree is healthier and longer lived than the long trunked. If the management would head every other peach tree there low, and the others fully as high as ordinary orchards are headed, give them similar cultivation and watch the results for ten or fifteen years, it would be an object lesson of great value.

I believe that the life of a peach orchard could be extended five or more years by not allowing trees to overbear. If the fruit is thinned and the trees are kept healthy year after year, you will get more regular crops, more peaches in the aggregate, and much higher prices, because they are larger and better quality.

We all know that there is a good deal of experimental work to be done in spraying, and it is unneccessary for me to more than touch on that subject.

Another thing I would suggest is that a Board of Control be appointed to consult with the management—men who make a specialty of some of the different varieties of fruit—and advise as to what experiments should be carried on.

E. D. Smith, M.P., Winona: A station such as that now established at Jordan has been greatly needed by the fruit interests for a number of years. I have advocated it most strongly for this reason; whilst we, as a portion of the Dominion have been contributing to the maintenance of experiment work at Guelph, Ottawa, and elsewhere, we have not had any experiments of importance with tender fruits, for the reason that these farms are in sections where they do not grow them. I think that Mr. Sherrington does not bear that fact strongly enough in mind. You have an experimental farm at Guelph, which has been in operation for a number of years, and experiments covering a large portion of the Province have been conducted there. The work, I assume, will continue. The Experimental Farm at Ottawa, and farms in the other Provinces, are continually making experiments that are of great value to the Province at large, but not to us. We might have been saved hundreds of thousands of dollars in planting worthless varieties if we had had such a station many years ago. For many years I have recognized the shortcomings of the qualities and kinds of our fruits. I have not the slightest doubt that there are trees of varieties in existence now that will fill many gaps in the lists. We can

succeed in testing them and bringing them forward only through a station such as this.

Conditions in regard to the industry have greatly changed. A few years ago our market was practically confined to Ontario; now it extends to other Provinces as well. Varieties that might serve well enough for the home market fall far short of being value for distant shipment. The growth of our market is almost entirely in sections we cannot reach with varieties grown previously. Take peaches for example; the great peach of the past has been Early Crawford; it is a magnificent peach in many respects, and is all right for shipping to Toronto, Ottawa, and Montreal, but for the Northwest it is of no value whatever. We have not a tender peach that we know of, with the merits of the Elberta, which will ship, and we want varieties covering the whole season; so that we need five or six more varieties as good as Elberta. We have had no opportunity for experimenting on that line.

Now that we have an experiment station, I hope one of the main objects and efforts will be to test varieties now in existence, but not generally known; but also to try to originate varieties that will carry better than existing ones.

Imagine what a market there would be in the Northwest for peaches, if we could lay them down sound, as we could if we had varieties as good as Elberta. Imagine the market we should have for plums if we could lay them down sound. Our pears carry all right, but we have not got an all-round good pear. It seems to me that the Experiment Stations of America are very weak that they have not introduced one. We have kinds that do not blight, but they have other serious defects which debar them from being valuable for shipping; or they are either too small like Seckel, or blow off like Anjou. A cross between these two might give the size of Anjou and the freedom from blight of Seckel, and the good quality of both. We are going out of the pear industry because blight kills the best varieties we have. There is great room for this Station to introduce a new variety of pears.

The same thing with grapes. There is a market in the Northwest that is entirely ours. Even British Columbia cannot compete with us in grapes, whereas it will do in other fruits. Imagine what a quantity we could grow and sell if we had a good shipping grape which would reach that market in sound condition. We have not got it unless it is a variety that has some serious defect. If we had a Lindley that would bear every year as I have seen Lindley bear once in twenty years, it would be worth millions of dollars. Concord is an excellent grape; the only fault with it is that it cracks so badly with handling the baskets that by the time they reach Calgary and the grapes are sold, half are mildewed from the cracks that are in them.

Hundreds of thousands of dollars have been spent on the experimental growing of apples. We have been paying our share towards it; what we want now is investigation in regard to the tender fruits that are grown so successfully in Southern Ontario.

Dr. Wm. Saunders, Director, Central Experimental Farm, Ottawa: I did not expect to be called on in this connection, because I have had little experience in the growing of tender fruits. I have looked on this new Station, as has Mr. Smith, as a Station for the growing of tender fruits, looking to the future of our peaches, pears, and grapes. It is true, we grow a large number of grapes at Ottawa, but the climate is not very favorable, and I would not recommend anyone to go into it there as a commercial undertaking.

I think that the subject you have under discussion is one of the most interesting that could have been brought up, and I have been interested in hearing what the different speakers have to say.

I have had a little more experience in the climates of the Dominion than most, and I have learned to regard the combining of all these qualities of fruit into one as an extremely difficult thing. I rather begin to take pity on the young man who has taken charge of this work, if he is expected and asked to accomplish all these things. I have given a good share of my life to such experiments, and we have never yet succeeded in combining all these good features in one fruit, or in one variety of grain. If we could get a variety of grain equal to Red Fife that would ripen three weeks earlier, it would be worth scores of millions of dollars to this Dominion. We have been working on that for twenty years, but we have not reached it yet. We have secured wheats from every country where we could learn of an early variety. We have secured earliness, but not the quality of the Red Fife. We are working now to try to introduce more Red Fife blood so as to improve the quality. But this will retard the early ripening. With wheat you have a crop every year, but in fruit you must wait seven, eight, or ten years to see the results of your experiments. I would utter a word of caution: do not to expect too much from the man in charge of this work. I do not care how large the committee of experts may be, he will find as many differences of opinion among the committee as he has experts. If such a committee is appointed, I would suggest that it should not be too large; half a dozen will be better than twenty-five.

A great many people are of the opinion (which I do not share very strongly) that soil is a great factor in producing different results in fruits. I think that climate has more to do with it. Sometimes soil has more importance attached to it than is warranted. Climate is certainly the great difficulty that we have to overcome. If the climate is unfavorable, we cannot produce fruits as a commercial undertaking at any rate, and if you cannot do that, you cannot supply the great market in the Northwest to which Mr. Smith has referred, where they can consume any amount of fruit that may be sent them.

I shall be very glad if we can make our work at Ottawa useful in any way to the work carried on at Jordan. We hailed with pleasure and delight the fact that the Province was going to do something in this direction. I think the Dominion should have done it long ago, but I have no doubt it will add to the results to have two or three institutions under different management aiming at the end desired, that of practical fruit testing in every respect, so that we may be able to point out to our people, what varieties they should grow, what varieties may be successfully shipped, and which they can get the most money out of.

Mr. F. H. Pattison, Grimsby: I think it was not only a matter of convenience, but also a matter of justice that this station should have been established in the district where it has been established. It seems a most singular anomaly that these tender fruits were experimented with at stations where they could not possibly grow them commercially. I have been informed that the tendency of this Association is in a measure to degenerate into a society of apple growers. The apple is the king of fruits of Ontario, but at the same time I should like to remind the members of the Association that there is more money invested in the *tender fruits of the

*Dominion Census returns for Ontario, 1901, show capital value of all tender fruits, including peach, pear, plum, cherry, grape and small fruits, to be only $16,145,200, as compared with $34,201,950 for apple trees.

Niagara district than in all the apple orchards put together, and it is a singular injustice that no station has been established there before.

Spraying with lime and sulphur will check or exterminate the San José scale, but it is a most unpleasant thing to apply. The experiment stations are hunting for something that will be easier to apply and as satisfactory, if not more so. This, for our district, is one of the most important things that could be taken up by the station, because that is the district where the scale is doing the most damage.

Along the line of new varieties, such as Mr. Smith has pointed out, experimental work is of the highest value to us. Hundreds of thousands have been wasted, and many varieties are being grown to-day that are absolutely worthless to the grower.

Mr. ARMSTRONG: I am in sympathy with keeping a limit on the number of varieties in commercial orchards. We already have varieties of peaches in our orchard which, if we knew how to trim them and bring them into bearing, would prove valuable in the direction Mr. Smith has suggested. The question is how to trim them to make them bear as well as Elberta; they will ship to Winnipeg all right, and I believe to the Old Country as well.

ADDRESS.

By Hon. Nelson Monteith, Minister of Agriculture, Toronto.

I regard it both as a pleasure and a privilege to be asked to preside at such an important gathering of those representing the fruit interests as I find here to-night. Last night I had occasion to visit the exhibition at Massey Hall, and was surprised and delighted at the excellence of the fruit there displayed. It is a great credit to you as growers, and is of great educational value to the people generally, demonstrating as it does the finest horticultural products of the Province. The only difficulty seems to be that the exhibition has not yet made its way into the hearts of the people sufficiently to induce them to visit it in such numbers as its excellence warrants them in doing. It is our duty, if possible, to popularize this exhibition in this the capital city of the Province.

The Department over which I preside fully recognizes the growing importance from year to year of the fruit industry of the Province, and we are prepared to recommend the spending of the funds of the Province in any direction where it is felt that such expenditure will bring good results. During the past year a number of publications have been issued by the Department dealing with the fruit industry. Some three or four bulletins have been placed in the hands of the fruit growers containing information which will help them make a success of the business. A notable addition to our literature this year has been the publication of "Fruits of Ontario," which is a valuable work of reference for those engaged in the business of fruit growing.

An enlarged field for horticultural experiment has been opened to us through the inauguration during the past year of the Experiment Station at Jordan Harbor in the Niagara District. This station will, we trust, accomplish much that could not be successfully undertaken at Guelph in the way of introducing better varieties than have yet been secured. In this work we desire the assistance and co-operation of the horticulturists of the

Province, and we shall call for the advice of some of your leading representatives in connection with the work we purpose conducting there.

As I have said, the industry of fruit growing is all the time increasing in importance. Of apples alone we have over seven millions trees at the present time. It is within the range of possibility that each of these trees could be made to bear from 1½ to 2½ barrels of apples. If this could be brought about, and the product could be advantageously marketed, it would mean a great addition to our material wealth. But this is only one of the branches of horticulture. You as practical horticulturists realize even better than I do how this industry might be extended all along the line; I merely wish to point to the possibilities of the business and its importance to the community.

The aim for which we should strive at the present time appears to be greater co-operation among us, not only in spraying but in picking, packing, and marketing. My Department, as you are aware, undertook this year for the first time to make a grant to any five or more persons who would co-operate in the spraying of their orchards with a power spraying outfit. The assistance offered has been taken advantage of in a gratifying manner. We are desirous of helping this movement along so far as we can from a departmental standpoint, as I believe that much good may be accomplished by greater co-operation among producers. I do not wish to trespass on the time of the meeting, and we will now proceed to carry out the program.

COMMERCIAL FRUIT GROWING IN WESTERN NEW YORK.

By Willard Hopkins, Youngstown, N.Y.

The subject of commercial fruit growing in Western New York will be confined principally to the Niagara Frontier and to our own personal experience. Living as I do on the banks of the Niagara River, where our principal orchards are located, and owning a fruit farm on the Canadian side of the river, I feel a personal interest in the prosperity of the fruit growing interests of Canada as well.

About thirty years since, I began planting commercial orchards, and have continued to plant and re-plant ever since until we have now upwards of 300 acres under cultivation, consisting of apples, pears, quinces, plums, prunes, peaches, and cherries, and, beginning with the latter, we have almost a continuous gathering of fruit until the last of the apples are harvested. We have trolley cars running through the orchard with New York Central connection, so that we can ship to any part of the country. In planting the eighty acres of apple orchard thirty years ago, I made the error of planting almost exclusively the late bearing varieties, Baldwin and Greening, consequently had to wait twenty years for a remunerative crop; while, if I had planted Duchess, Hubbardston, Wealthy, and other early bearing varieties, I should have gotten returns in less than half the time. The quince orchard of about 1,200 trees, planted thirty-five years since, has borne crops almost yearly since six years old, and the present year gave us over 400 barrels, selling for $1,500. It has been necessary to spray them at least three times through the season to prevent black spot on leaf and fruit. The soil is a dark surface and heavy clay subsoil. Have scarcely used any fertilizer on this orchard.

We have about 10,000 pear trees growing, principally Bartlett, Kieffer, and Duchess, of various ages, and often gather 3,000 barrels of fruit, which is taken readily by home and export trade. The Bartletts usually go into cold storage within twenty-four hours after gathering. Well do I remember before the advent of cold storage for Bartlett pears, when the ordinary life of the fruit was about a week after gathering, seeing selected Bartletts offered on the Buffalo markets for 75c per barrel. Now, with the present facilities for handling them, we get from three to five dollars per barrel.

We endeavor to give our pear orchard clean cultivation and spray them two or three times with Bordeaux mixture. We try to go through the orchards once in ten days and cut out the blight in seasons when it is bad. Our plums are principally Niagara, Lombard, Coe's Golden Drop, and prunes of the Fellenberg variety. We never fail in having a crop of some variety and frequently of all varieties. The plums are largely used by local canning factories and the prunes go to Pittsburg, New York, and Philadelphia. They also are given two or three sprays of Bordeaux. In our early experience with prunes, they would make quite a growth up to the last of July; then the fungus would ruin the leaves, which would drop, and then start a new set of leaves in September, and the trees would go into the winter in bad shape. Since spraying, they and the Lombard plums carry a rank foliage all through the season.

A portion of the land occupied by our peach orchard of twenty acres has been growing peaches for the past seventy years with scarcely any time elapsing between the removing of the old orchard and the planting of the new one. Nine years ago we removed an old orchard, principally Early Crawford, that was badly infested with the yellows and small peach. We cultivated the land one year, and the following spring planted it to Reeve's Favorite, Elberta, and Late Crawford, and it has borne abundantly for five consecutive years. The sales from this orchard of 20 acres the present year realized upwards of $9,000, exclusive of packages or commission. This orchard, now eight years planted, was examined by government inspectors who found less than twenty trees with yellows or small peach.

We endeavor to keep our peach trees headed back so that they can be picked from a six foot ladder. One cannot be too careful in selecting varieties for planting. Take the Longhurst or Hill's Chili for instance, which succeeds well on warm early land; on ordinary land it is absolutely worthless. The Late Crawford and some other varieties which succeed so well with us, on the lake shore are subject to fungous troubles and are often shy bearers. In planting peaches, as well as other fruits, study your locality and conditions well, and get the benefit of others successes and failures. Fruit growers have no secrets. We are always willing to give away any information we have no matter how expensive it has been to us to secure. Within three miles of this orchard on either side of the river there are a number of farms of 100 acres each, portions of which are well adapted to peach growing, where the sales from the entire farm would not amount to the returns from an individual acre of this orchard, and the owners are living principally upon scenery. About four years ago the San José scale appeared in our orchards, coming from an infestation in Niagara-on-the-Lake, four miles away. They thought it had been carried by birds, particularly crows, which made nests in our large apple orchards. At first we received very little practical assistance from our experimental stations either at home or in Canada. I often think of the crude way your inspectors and experimenters, Messrs. Fisher and Healey, were preparing the sulphur, lime

and salt wash on a cold day in the last of March in an old iron kettle, and testing the effects of it on a few trees in the garden, and we concluded that if we had to apply that preparation to our 300 acres of orchard, we would surrender. But we established an experiment station of our own, using whale oil soap, sulphur and lime, and crude oil emulsion, and have got to using P.A. crude oil on our large apple orchards, put on just as the buds open, with the finest nozzle. This treatment we recommend as a last resort when the trees have been badly neglected. Ordinarily, we find crude oil emulsion prepared by putting 30 or 40 gallons of water in spraying tank, then put in 12 or 15 lbs. of whale oil or other soap and boil until soap is all dissolved, then pump 50 gallons of oil into the tank keeping the steam turned into the tank all the time, then fill tank to 200 gallons, keeping agitation going all the time. We use this emulsion one year, and if not comparatively free from scale, follow it the second year with sulphur and lime. We removed the upper storey from our 30 year old apple orchard, and now find comparatively little difficulty in reaching the tops of the trees with the spray, standing on an elevated platform on the wagon. I now show you a sample of fruit taken from this orchard, which three years ago was so badly infested with scale that the trees were dying and the fruit was only fit for the cider mill or dryer. The fruit is comparatively clean, and we had the satisfaction of selling it for $3 and $3.50 per barrel this season. We use sulphur and lime on our peaches, pears, and most varieties of plums and prunes. In our various orchards we have three, eight or ten horse-power boilers, with elevated vats, for cooking the sulphur and lime and the emulsion, and use four power sprayers and two hand sprayers. With modern means of applying these remedies, is it not surprising that hundreds and thousands of acres of apple orchards in Western New York, and in Canada between Hamilton and the Niagara River, are being abandoned, and in many districts you have scarcely enough apples to supply home demand and the canning factories, let alone any for export. There has always been great fear among small fruit growers that soon there would be an over-production and no remunerative market, like in 1896 when fine apples sold from 50c to 75c per barrel, and other fruits in proportion. Now this San José scale should allay our fears on that score. While orchards that are infested with all other pests may survive and be reasonably productive with careless or no cultivation or spraying for years, these untreated, scaly orchards are fit for the brush pile in from two to five years. You might as well hope to grow potatoes without spraying to eradicate blight and potato bugs as to think of growing a high class fruit without the use of spraying in a scale infested district. Such person had better quit the business, or what is better still, never go into it.

This general distribution of the scale through Canada and the States has been brought about by planting unfumigated nursery stock. Prof. L. O. Howard, of our Department of Agriculture, tells us that, in spite of the wide dissemination of scaly fruit in this country and to some extent abroad, there is not a single authenticated instance of the scale having been established from such fruit. In one of our old Greening apple orchards, the scale had killed most of the ends of limbs. We cut it back to within three or four feet of the trunk two years ago, and we now have a vigorous top, low down, and hope for good results. The same is true of our peach trees where cut back on account of scale. They have grown fine tops and are bearing excellent fruit equal to young trees.

The great question is, does fruit growing pay? When I see young men in our fruit growing districts leaving the farms for work in the shops, on the railroads, and many of the professions, for the great wheat growing districts of the Northwest, or chasing the will-o'-the-wisp to gold and silver fields, like the Klondike and the Cobalt, and overlooking the golden opportunities right at home, I think something must be radically wrong. The old-fashioned happy-go-lucky manner of fruit raising does not afford sufficient remuneration to keep the boys on the farm, while I could cite you hundreds and thousands of instances where small farms of 100 acres in Western New York between Genesee and Niagara rivers, with only a portion of them in fruit, have earned for the owners a competency producing, in single years, five, ten and even fifteen thousand dollars.

I recall an instance of a young man buying six years ago a 100 acre farm for $7,500, with 30 acres of fruit. It was paid for in four years, and this year he received $7,000 for the fruit on the trees from his 20 acre apple orchard; while another orchard of equal age and size within one-half mile gave as many hundred dollars. The scale and codling moth took the one, and sulphur and lime and Bordeaux took the scale and codling moth in the other. Another instance where a young man a year ago bought a fruit farm of 140 acres for $25,000, having $5,000 capital, and his sales this year realized over $15,000 from this farm. I could cite you, too, instance after instance where neglected fruit farms were bought and paid for in a short time by up-to-date young men.

The fruit growers' life seems to me very much to be preferred to that of a clerkship, even in a Government office, or an ordinary profession. Where is there a more delightful spot for a home than in your Niagara Peninsula or in Western New York? Instead of having to send our products thousands of miles to market, paying often three or four hundred dollars per car, we are within twenty-four hours ride of forty million hungry people.

In conclusion, I would say I have no regrets that I selected fruit growing as a calling. After all its vicissitudes, when, four or five years ago if seemed as if the scale would ruin all our orchards, it seems like getting back what I thought was lost. Although the present season was unfavorable for many varieties of fruits, we were gratified to receive from the sales from our home farm upwards of $20,000, and from all our orchards upwards of $26,000. After deducting the amount paid for help, spraying, material, and machinery, we have a nice bank account to winter on.

The Globe Peach appears to have a very delicate skin and is a shy bearer. This year the fruit did not nearly mature, while alongside these trees other varieties bore so that we had to prop them up. This peach is really the only failure we have had.

As to the use of crude oil, it is a very dangerous treatment unless used with skill and care. I know of an instance of a man (you might call him an unprogressive farmer as he never attends our farmers' clubs or reads our bulletins), who heard somewhere that crude oil would clean out the scale. He bought a few barrels, but not knowing that a special nozzle was necessary, he used his old Bordeaux nozzle and gave the trees a good drenching. He was surprised to find soon after that his trees had lost all their foliage, and it took them some time to recover it. If it had been used in a practical way with the finest kind of nozzle, he would probably have had excellent results. That has been our experience.

In our apple orchard we leave a strip of grass six or eight feet wide between the trees so that we can drive over the land in the spring with our

heavy sprayers. We get very high color, noticeable particularly with our Baldwin apples; even the small fruit bears this high color.

Q.—What spraying machines do you use?

A.—Our experiment station uses everything that comes along, almost. The Gasport people make a very effective handpump for tall orchards. We use gas engines for power sprayers

Q.—Have you used any of the commercial spraying preparations?

A.—We have never taken any stock in Scalecide and other preparations, which are designed to make money out of us poor fruit growers.

Q.—Have you ever used the wheel-power sprayer?

A.—It is all right for small orchards of from 15 to 20 acres. It seems to me it is better if anyone wants to purchase a gasoline spraying outfit, for three or four neighbors to have a kind of a stock company. The only objection to that is that everyone may need to spray at the same time, but that can be arranged better than to undertake to work an inferior outfit.

Q.—Have you used the Niagara gas sprayer?

A.—No; but I have heard it well spoken of.

Q.—At what pressure do you run your power sprayer?

A.—We make it according to the height of the trees.

Q.—What horse power engine do you use?

A.—About 2½ or 3 horse power. We have a number of engines, using them for cutting feed, sawing wood, etc.

METHODS AND RESULTS OF THE WORK FOR SAN JOSE SCALE CONTROL IN PENNSYLVANIA.

By Prof. H. A. Surface, Harrisburg, Pa.

In the Keystone State we have for years recognized the necessity of active efforts on the part of the State authorities and also fruit growers to save their orchards from the generally distributed and deadly San José Scale. For four and a half years the speaker has been concentrating his efforts, in the official capacity of the State Zoologist of the Department of Agriculture, upon the general topic of destructive insects, with special reference to the San José Scale. Our State has undertaken and accomplished certain work, which is now making itself plainly manifest. We had before us an unbroken field. The question was how to work out in detail the answers to the problems of our fruit growers. We must first secure the co-operation of the Legislature to obtain proper legislation and financial assistance in the form of appropriations, for without money no such great work as the suppression of this pest could be accomplished, or even properly undertaken. For a little over six years we have had legislation and funds providing for nursery inspection only, and although this work was properly done, it alone did not meet the full requirements of our fruit growers. We found it necessary to face four distinct problems. These were as follows:—

1. The determination of San José Scale in existing orchards, and instructing the owners of its presence and how to recognize it.

2. Educating the public to the importance and methods of suppressing such pests as soon as possible, and thus providing for preventing its further spread within the orchards or from the premises of one to those of another.

3. Inspecting nursery stock to guard against the further dissemination

of this pest on young trees, and particularly the inspection and cleaning up of premises around nurseries, in order to insure clean nursery stock.

4. Provision against the importation of pests on infested nursery stock or otherwise from other States.

We can now say that the results are such as to prove that solutions practical, effective, economic and satisfactory have been reached for each of these points.

Our work in conveying knowledge of the San José Scale and other orchard pests to the tree growers of our State has been accomplished by a corps of active orchard inspectors and demonstrators and by the publication of a periodical non-technical bulletin, aiming to state in plan language the practical facts concerning insects and higher animals found within our Commonwealth. Four years ago we had no mailing list. This was built up gradually by applications for the monthly bulletins. The law then prohibited the publication of more than twenty-five thousand (25,000) copies of each issue of such bulletins, but within three years the requests for these publications became sufficiently numerous to justify our last Legislature in passing a law providing for the publication of fifty thousand (50,000) copies of each issue. Upon the day of preparing this manuscript my mailing clerk reported to me that within the past week we has received 2,500 applications for the bulletins, coming mostly from teachers and farmers of our Commonwealth. I have brought some of these bulletins for free distribution, and can say that I believe they have been very effective in helping to spread a knowledge of the importance of combating insect pests, and consequently creating sentiment in favor of this important work. Almost daily we receive letters from persons who report that they have saved their trees from destruction by the San José scale by the methods outlines in our publications or correspondence.

The second method of extending practical knowledge of this subject has been to send our inspectors directly to the orchards, and in fact to all premises in the Commonwealth to make inspections of the various trees and shrubs liable to be attacked by the San José scale and talk with the owners concerning these pests, and also give us official report of the findings at each place.

We follow this by an official announcement sent from our office to each person with infested premises, telling him what was found upon his trees or bushes, and enclosing to him a circular of information, giving methods of treatment.

He is also sent one of our bulletins devoted to the San José scale, on which topic two issues annually are prepared,—one in the fall of the year and the other in the early spring. These are in order to be ready to meet the demands for information in the fall and spring spraying seasons. In this way there have been tens of thousands of inspections made in this State. We are gradually covering each of the sixty-seven counties and informing the owners of each orchard what kinds of pests are present and how to treat them.

In addition to determination of kinds of pests we must disseminate practical knowledge of the means of controlling such insects. For this purpose we have inaugurated a system of public demonstrations. Beginning about this time of year our inspectors take up this work. Public meetings are arranged in orchards at intervals of four or five miles throughout the infested districts. Large posters are prepared and put up in public places, and announcements are made through the newspapers concerning the dates and localities of the proposed demonstrations. Our demonstrators are equipped

with apparatus for boiling the lime-sulphur wash, a spray pump and complete outfit for each, and such knowledge of the subject as to be able to address an audience and answer questions. On the appointed day, rain or shine, their apparatus is taken to the assigned place, arrangements having been made in accordance with the following:

Application for Public Demonstration.—The demonstrator boils and applies about thirty gallons of the lime-sulphur wash, delivering a public address during the time of boiling, and answers such questions as may be asked him, also distributing bulletins and taking names for our mailing list. He is careful to perform all the steps necessary for successful spraying, especially including the second or re-touching coat. When owners see how easily this is accomplished, notwithstanding the statements as to the difficulty of application made by agents and manufacturers of commercial insecticides, they commence to take heart and spray, and the successful results of a few persons in the neighborhood are enough to induce others to "go and do likewise."

We have seen the need of commercial sprayers or men who own spraying apparatus and do spraying by the tree or job. We encourage this, and send our assistants to give free instructions to such persons. In general, good reports have reached our office concerning this commercial work, and we believe there is a bright future before it. The public demonstrations have been conducted during spring and fall for two years, and instead of the applications for such demonstrations and interest in them decreasing, they have increased, as the public sees the beneficial returns to persons who have been doing spraying. More questions are asked of demonstrators, our correspondence has greatly increased, and while we thought it might be possible to drop the work soon, because the public would be sufficiently educated to no longer demand its continuation, we can now say that it is only in its infancy, and we shall never reach the end of horticultural advancement. While the Legislature two years ago appropriated thirty thousand dollars per year for two years for this work, the last session of the Legislature appropriated forty thousand dollars per year, and the sentiment is now such that no doubt such sum will be given for the continuation of this important work as our citizens may require.

The person who has been led to think, by newspaper accounts or otherwise, that Pennsylvania is a State given only to political jobbers and robbery, can see in this that the public funds are really being used for the benefit of the masses.

Experiments with new insecticides, apparatus and methods of application, and other features for insect control, must be performed by us in order to obtain the most reliable information to place before the public. The speaker purchased a small farm, near Harrisburg, and planted trees thereon, and is using the bearing trees, as well as the younger ones, for experimental and practical purposes, at his own expense. Also, we have been able to obtain permission of many persons in the vicinity of Harrisburg to perform such experiments as we found advisable in their orchards. This has given us a positive knowledge concerning the various topics which we need to discuss by correspondence, in bulletins, or public addresses. The results of there experiments are published in the monthly bulletins or in our annual reports.

After controlling or suppressing the San José scale in orchards, it is very important to prevent further importation of this pest upon nursery stock or otherwise. With this in view, our legislation has been revised to some extent, giving the Secretary of Agriculture authority to take such steps

as he may deem necessary to prevent the importation and also the spread of the San José scale and other insect pests in our Commonwealth. I believe such laws to be wise and just. Instead of enumerating details as to the methods of procedure, and thus holding him down to hard and fast lines, established by law, he is given authority to act as he may find best, according to the circumstances. Of course, his action is through the State Zoologist and the inspectors, but we find such sentiment for proper prosecution of this work that we have not yet been obliged to resort to the final "iron hand of the law." This law, however, provides that should a person fail to carry out our instructions as to dealing with the San José scale, we must perform the work on his premises, and the expense thereof becomes a lien upon the property, just as a regular tax.

We have found it especially important to inspect the premises of adjoining nurseries to be sure that the nursery stock itself is kept free from constant re-infestation. While a few owners uttered protests against being obliged to destroy, spray, or treat their trees, because they were a menace to the adjoining nursery stock, there were none who did not finally comply with our request to clean up the pests on their premises; and the nurserymen are now well satisfied with the knowledge that, while our methods in the nurseries have been rather stringent, we are looking to their own good, as well as to that of the fruit growers.

We inspect nurseries twice per year, during August or soon thereafter, and also in February or March. This is an account of the possibility of the spread of the scale after the August inspection, and also because in midsummer it is impossible to make an inspection as accurate as it can be made when the leaves are off. There are about one hundred and fifty nurseries in our State, and four special nursery inspectors are required to do this work during the season for such inspection. If no San José scale be found the nurseries are authorized to sell the stock with fumigation, but if scale be found, the trees bearing the same must be destroyed or set aside for treatment and re-inspection, and the owner must give affidavit that he will fumigate all tree of varieties liable to be infested by scale before shipping them. A fumigation house must be constructed and is tested by our inspectors. An official license or certificate is then granted to him. As a result of this, there is not nearly as much scale found in the nurseries as formerly, not nearly as many nurseries infested, and not much living San José scale sent out on nursery stock.

To prevent the importation of scale into our State a law was passed, practically at the request of our nurserymen and fruit growers, providing that all stock of varieties liable to be infested with San José scale must bear not only a certificate of inspection but also one of fumigation before being brought into the State of Pennsylvania. The transportation companies are held responsible for carrying packages of nursery stock not tagged in accordance with the requirements of the law. To prevent further possibility of the spread of the scale by unscrupulous tree dealers selling bad stock, as has been done in some of our counties, we now require that all tree dealers must be licensed by our Department, in order to transact business in this Commonwealth. In order to obtain this license they must give the names and addresses of firms from which they expect to obtain nursery stock. The sources of the proposed stock are then investigated, and if the nurseries be found certified and doing business in their own States, their stock is accepted in ours, upon their certificates, with additional requirement of their fumigation tags also attached.

Provisions are made for taking care of the man who neglects his orchard and lets it become a menace to his neighbor. Any person can notify the Department that San José scale is present or suspected in a certain orchard, and it is our duty to send an inspector to make an examination and return an official report. If the scale be found present, we notify the owner and give him a certain length of time in which to treat it in accordance with the methods we find best. For example, if the trees be practically worthless and badly infested, and it be better to destroy them than treat them, we require their destruction. We generally give opportunity to spray, and as far as is possible give the owner the choice of insecticides if used at the strength which we prescribe. At the expiration of the allotted time, the premises are again inspected, and if the infested trees or shrubs have not been treated in accordance with our directions, we must do this at the expense of the owner, as stated above, for property adjoining nursery stock. We have not yet had a case of absolute refusal to comply with our request.

The results of this activity are being made manifest by better fruits than ever before. More persons are planting young trees, and older orchards are giving better returns. To-day there is hope, where three or four years ago there was darkness and despair. Hundreds of orchards in our State were either killed outright by the San José scale or destroyed by the owners because thought ruined by this pest. To-day there are hundreds of growers, such as Mr. G. C. Gelwicks, of St. Thomas, and others I could name, who have written to me that they now have excellent crops of fruit from infested trees which they had intended to destroy, but saved them by the help the State has given. Growers are encouraged, and we ourselves are made to take up the heavy burden with lighter hearts and renewed activity, because we see good results and bright prospects ahead.

F. H. Pattison, Grimsby: Is the scale spread by the importation of infested fruit?

A.—The scale can be spread only in its young and free moving stage. It is not spread by ripe scale infested fruit.

Q.—Would you allow the moving of scale infested fruit?

A.—Yes; I would not expect it to be carried by such fruit. The scale will get on fruit and fix on fruit, and before that fruit is ripe, it will reproduce. You will find scale on fruit on the tree; they have not been produced on the fruit but have crawled on to it.

Q.—In Toronto, in August, I saw pears exposed for sale in every stage of ripeness that were infested with scale; should this not be prohibited?

A.—I would not recommend prohibiting the marketing of such fruit, unless by so doing you compelled the growers to clean up their trees. I have tried my best to infest trees by placing scale infested apples in an orchard without success and know that it cannot be done. I will stake my reputation that scale cannot be carried on ripe fruit. I consider that the laws of Belgium and Germany in regard to scale infested fruit are unjust.

Mr. Cutting, *Canadian Horticulturist*: I have twenty letters from leading entomologists in the United States written during the past week in response to my enquiries on this subject, and in only one instance does the writer entertain the possibility of disseminating scale by means of infested fruit. Forbes and Howard are among the number.

Prof. Surface: These are two of the world's leading entomologists. A third is your Prof. Fletcher, who is of the same opinion.

INFLUENCE OF STOCK AND SCION UPON VARIETIES.

By W. T. Macoun, Horticulturist, C.E.F., Ottawa.

The question of the influence of stock on scion has been discussed more or less for two thousand years. The Romans were interested in the subject, and since then from time to time many scientific and practical men have written about it, and at the present time it is probably more discussed than at any other period in history. It is a live subject, and, therefore, one concerning which there is still something that is not yet known.

A few days ago I received the following communication:—"At a country village just outside Birmingham, England, I saw some splendid bunches of red and white currants which has been budded on the standard of the English wild rose."

There is evidently a good deal yet to learn on the subject of stock and scion. Some things seem to be fairly clear; one is that stock and scion do not unite as an organized whole, but form a more or less mechanical union. That is to say, the tissues do not unite physiologically, but merely mechanically. This fact seems to have been clearly proven by experiment. Where there is not a good mechanical union between stock and scion, the top will sometimes completely break off from the stock and the tree is rendered valueless. We have tried top grafting the European plum on the American plum. The result has been that in a few years the top has died, the union not being a good one. The same way with the sand cherry and the American plum.

Certain stocks suit the scions of some varieties much better than others, and closer study should be given to this question in the future. It is well known that certain stocks are better for the peach than others. It is the same with the plum and many other fruits, but we still have a great deal to learn in that regard.

The Board of Control of the Fruit Experiment Stations has started an experiment to try and solve the question of root killing of peach trees, which has been the chief cause of failure of the peach industry in the Leamington district. It has been suggested that this might be overcome by grafting the peach on plum roots. If anyone will look up the horticultural records of the early part of the 19th century in England, they will find that in those days the same thing was recommended for England, where the soil was colder than that of France and parts of Europe. I am fairly confident that when we get such an orchard started in the Leamington district, we shall get some results that will be surprising. It was found by the old experimenters that the peach would not live as long on this stock, but it has lived long enough to give very profitable crops. Mr. A. M. Smith has been propagating for the Board a large number of peaches on plum stock.

Regarding the affinities of trees, it is surprising how often trees of unlike character will produce a good union. At Ottawa we have top grafted the June-berry (*Amelanchier*) on the Mountain Ash. The union is perfect, and is only to be distinguished by a difference in color in the wood. The pear grafted on the Mountain Ash has succeeded very well, and others in the same way.

Some of the most interesting experiments of recent years have been carried on in France, the results of which have lately been published. You know that for years people have said they noticed some influence of stock on scion, but it could not be shown that there was any influence on the character of the fruit. I think all will agree that the influence is so slight on the fruit as not to be observable. The French experimenters, however,

have been carrying on experiments with herbaceous plants, where the result is seen sooner than in fruit trees, and the results are said to have been very marked as showing the influence of stock on scion, and *vice versa*.

I mention these things to show the possibilities in the future in the study of this subject. In the past we have looked for an immediate effect on the fruit itself. Where we should look for it is in the seedlings. If we were to take the seed from the fruit of a top grafted tree, we should be likely to find the influence of the stock on the seedling.

A. W. PEART, Burlington: If you were to take the Northern Spy and top graft on the Red Astrachan and Tolman Sweet, from your present information, would you consider that the Spy would be a trifle earlier on the Astrachan than on the Sweet?

A.—I should not consider so. We had one-half of a Duchess tree top grafted to Spy at Ottawa, so as to give one-half Spy and one-half Duchess, and the Spy always failed to mature before the frost came. The Duchess ripened practically at the same time as when not grafted. The Spy would make very strong growth, and the Duchess only an inch or two.

What we do know is that the stock influences the scion in the way of fruitfulness. Apples grafted on Paradise stock will fruit much earlier than on ordinary stocks, the result of such a graft being that the flow of sap is slower, so that there is more nourishment for the top of the tree than is absolutely necessary for leaf growth, and the extra nourishment goes into the development of fruit buds. It is, I believe the superabundance of sap in the top that causes fruitfulness. If we bear that in mind it will make clear all the results we get from top-grafting. With top grafted trees there is no perfect union, and the result is an abundance of sap for the top and early fruitfulness in consequence.

A MEMBER: Does not the practice of budding from row to row in the nursery, instead of taking the buds from matured and bearing trees, tend to decrease fruitfulness.

A.—At Ottawa we have about 140 Wealthy apples which have fruited since 1899. Some of these were grafted from very productive trees, others from less productive trees, and others from trees that bore poor crops every year. We grafted in two ways; we had them growing on the ordinary stock, and also top-grafted so that there were two top grafts on one stock. We have not had these growing long enough yet to give definite results.

To give an example; a few years ago I got some scions from Mr. Harold Jones of a very highly colored Fameuse which he has in his orchard. We grafted these on some of our trees. They fruited this year and the fruit is just as highly colored as in Mr. Jones' orchard, whereas on most of the trees at the Farm, the Fameuse apples are of the ordinary striped variety.

Mr. SHERRINGTON: Is there any stock that will by top-grafting bring the Spy into bearing earlier?

Mr. MACOUN: That is an experiment which I think might be made one of the most valuable at the Jordan Station. Lay out an orchard with varieties having strong growing trunks, and top-graft the Spy on each of them. We found at Ottawa that the Duchess brought the Spy into bearing in five years, but the top broke off a few years after fruiting. If we could find a stock that would make a good union and bring the Spy into bearing earlier, it would be of great value. We cannot do that at Ottawa, as our climate is not suitable for the Northern Spy type.

Mr. METCALF: When two varieties of the same kind of fruit are planted together, what would be the effect of cross-pollenization? I have in

mind say Kieffer and Duchess pears: mixed planting is said to be somewhat beneficial to the Kieffer.

A.—There is no doubt that mixed planting will, as a rule, produce far better results. Several cases have come to our notice. There was some discussion on the Lindley grape not bearing large grapes regularly. We have about 200 varieties of grapes in our vineyard, and our Lindleys produce large crops every year, the bunches being more perfect, I think, than in the Niagara district. There are so many other kinds around them that they get the kind that suits them, and are well pollinated. I know of an orchard in the Annapolis Valley where there are few trees of Golden Russet scattered among the other varieties, and I think they bear better crops than I ever saw elsewhere.

I should warn you in regard to planting McIntosh. We have found this apple to be self-sterile, and if planted in blocks by itself, it is not likely to produce nearly such large crops as if planted with other kinds. Be sure to plant other kinds with them that blossom at the same time.

Q.—Do you consider that Spy grafted on Ben Davis would be satisfactory?

A.—I should not think that any tree that comes into bearing as early as the Ben Davis, and yields as heavily, would do for Spy. I think it requires a stock that attains a certain vigor before it starts to bear, to be able to main tain the Spy.

Q.—I have them succeeding well on Ben Davis; they are twenty years old.

A.—Then it looks as though they would succeed. I have tried early bearing varieties with strong growing tops, and in every case they have been failures.

Prof. H. A. SURFACE: Upon this subject I have but little to add, for two reasons, first, Prof. Macoun knows much more about it than I do, and, second, I am not a professional horticulturist, and this is a subject that requires the study and observation of years of one working on horticultural lines. I can only give the results of superficial observation and study, and the information gleaned from other persons who had more ample opportunities than I had.

This is a much controverted question. I am inclined to think that the relationship of plant to stock is not so great as has been indicated by some persons who have written on the subject. There have been no definite laws established so far as I know. There has been but little of a definite nature written on the subject. There have simply been isolated observations here and there, which we try to put together. The York Imperial is just now the leading commercial variety in the southern part of Pennsylvania. The variety top-grafted on the Spy does not give satisfactory results, but when the York Imperial is top grafted on any other stock, we get good results.

Some stocks have a particularly good root system—the Ben Davis for example—while the Winesap has a poor root system. We know that some trees transplanted from the nursery will lean over more than others from the wind. This may be because of the difference in the root systems, a tree with a good vigorous root system not being leaned to the same extent.

I heard of a case where a nurseryman had a few trees of a white seedling apple, and on one of them the fruit always developed rot. The tree seemed to have a particular individuality of its own. They top-worked it with Spitzenburg and top-worked other similar trees at the same time. They found that on this particular tree the fruit of the Spitzenburg continued to

rot and fall, whereas on the other trees it remained sound. The conclusion from this was that the root had a direct effect upon the fruit.

We know that the Spy bears earlier in its life on some stocks than on others; also that the union is less perfect on some stocks than on others. I am inclined to think that this union is a restriction to be compared to pruning or ringing, for we know that ringing done at a certain time of the year to restrict plant growth will have the effect of making a tree fruit earlier, just as abundant pruning will do. I was told to-day by an English orchardist how they cut the tap-root of the tree to check its growth, and that it results in an earlier fruiting period.

It might be worth considering whether the effect of the scion on the root is not greater than that of the root on the scion. We know that the really useful material is elaborated by the leaves of the plant and not by the root. The roots merely take up raw material. I should not be surprised to see greater influence of scion on stock than *vice versa* on this account.

The whole subject is one for prolonged observation and experimentation, and I should prefer to be excused from talking on a subject on which I do not feel positive.

HORTICULTURAL DEVELOPMENT IN ONTARIO.

By Prof. H. L. Hutt, Ontario Agricultural College, Guelph.

The wonderful progress that has been made in the various branches of horticulture in this Province during the past decade is something that very few fully realize. I wish to call attention to a few points in this connection, for it is by considering the progress in the past that we come to an understanding of our present position, and are able to form some idea of the outlook for the future.

Horticultural development in Ontario has been characterized of late years by specialization, organization, and co-operation. No doubt the rapid progress of late has been brought about largely by specialization and co-operation, and the results already attained certainly augur well for the future.

As an indication of the recent progress let me call your attention to the numerous and varied horticultural organizations we now have in Ontario, most of which have been organized within the past ten or twelve years.

In fruit growing, besides our Provincial Fruit Growers' Association, which was about the only horticultural organization heard of about ten or twelve years ago, we have a number of local organizations in the large fruit centres. Then we have another Provincial organization, the Co-operative Fruit Growers' of Ontario, and about forty local co-operative associations, actively engaged in the handling and marketing of the fruit crop, or in all about fifty organizations under the head of fruit growing.

Then we have the Ontario Vegetable Growers' Association, another Provincial organization, and about twenty-five local vegetable growers' associations organized within the past two or three years.

In floriculture we have what is called the Canadian Horticultural Association, an association made up largely of the commercial florists of Ontario, who also have local organizations in some of the largest centres of the trade, as they have here in Toronto.

These associations are all made up of those more or less commercially engaged in one or more of the branches of horticulture. Then there are the amateur horticulturists with their Provincial organization and sixty-six local Horticultural Societies in various parts of the Province. In all about one hundred and fifty purely horticultural organizations.

There is not another Province in the Dominion nor a State in the Union that can compare with Ontario for completeness of organization. Does not all of this indicate that our people are becoming alive to their own best interests, and are uniting so that by mutual co-operation they may make still more progress in the future? I firmly believe that because of such organization and co-operation the progress of the next ten years will be many times that of the past ten.

I regret that as yet we have not full or reliable statistics as to the status of these varied industries. Both the Provincial and Federal Governments are considering the problem of getting such statistics, and I trust that before long these figures will be available. The fruit statistics presented by Mr. A. W. Peart at the last Dominion Conference of Fruit Growers gave us a little idea of the value of the fruit industry of the Province. The capital value of the fruit industry is estimated at between fifty-five and fifty-six million dollars, and the annual value of the fruit trade is put at about $8,000,000. This is merely the fruit growing end of it, to say nothing of the many allied industries.

The canning industry affords a good illustration of the development and progress of some of the allied industries. Fifteen years ago there were only six canning factories in Ontario, now there are sixty-six, and the number is increasing every year. These factories employ about seven thousand hands, and pay out for produce about $800,000 a year. The establishment of so many canning factories within the last few years is a most hopeful sign of the progress of the times. They afford a ready means of disposing of a large part of the crop, whereby it can be conveniently distributed to all parts of the country and made use of at all seasons of the year.

Regarding the vegetable growing industry, we can get as yet no very reliable statistics; but I think I am safe in saying that one phase of the industry, that of forcing crops under glass, has doubled many times over during the last five years.

Commercial floriculture is another branch of horticulture that has made wonderful strides within the last few years. It has been estimated that this trade has increased four hundred per cent. during the past ten years, and now amounts to about $2,000,000 per year.

I need not say more along this line. I refer to it merely to show how horticultural work is specializing and developing. Fruit growers are specializing even in the culture of certain classes of fruits. Vegetable gardeners are specializing in field and forcing-house crops. Florists are specializing in the production of cut flowers and decorative plants, while the ever increasing number of enthusiastic amateurs, in both town and country, interested in all branches of horticulture are giving more attention to town and country gardens or civic and rural improvement. And for all both commercial and amateur, in each line of work the outlook never was brighter.

There are no doubt a few dark clouds in the sky. The San José scale has come in and appears to be going to stay. But this only means that the men who do not spray will have to go out of the business, and the wide-awake, aggressive and progressive growers who wage war on this and all

other such pests are going to grow more and better fruit. The failure of the railroads to provide adequate facilities for handling the fruit crop is a matter that was well shown up by a few of our leading fruit growers before the Railway Commission in this city last week. This will be remedied, no doubt, in time, and the sooner the better for all concerned. There will always be battles to fight, but such fighting keeps us keen and on the alert.

If you will permit a personal reference, I may say that when, fifteen years ago, I was appointed Horticulturist at the Ontario Agricultural College, I was the first in the Dominion to outline and teach a regular course in horticulture. And for years, until the School of Horticulture was opened in Nova Scotia, ours was the only institution in Canada giving instruction in horticulture.

At that time fruit growing, because of the commercial importance it had attained, naturally overshadowed the other branches of the subject, and vegetable gardening, floriculture and landscape gardening, were looked upon more as side issues, and were treated on our college curriculum more from the standpoint of the amateur. But such is not the case to-day. These one time minor features in the Horticulture of the Province have made such wonderful advancement during the past few years that none of them care to take second place even to fruit growing.

The development and specialization in Horticulture and the commercial interests concerned are opening up extensive spheres for our young men, and the demand on our educational facilities increases in proportion. The introduction of Agriculture and Horticulture in our high schools; the development of our Fruit Experiment Stations; the extension of our co-operative work in which there are already over six thousand experimenters engaged; the establishment of our new Horticultural Experiment Station in the Niagara District; with the improvement of the facilities in our own College which we are looking for, as well as the kindly co-operation of the Experimental Farm at Ottawa, and the new colleges in the other Provinces, all these should afford to the rising generation inspiration and equipment for the work in which they are to engage. The horticulturist of the next ten years, whether fruit grower, vegetable grower, or florist, is going to have an immense advantage over his predecessors of the past decade.

THE PLACE OF THE FALL APPLE IN FUTURE PLANTING.

By Alex. McNeill, Chief of Fruit Division.

I accepted the invitation to speak on this topic with very great pleasure from the fact that I have a few opinions with reference to the position of the fall apple. These opinions I am anxious either to propagate or else have them corrected before they do mischief. Therefore I submit them to you in the hope that they will be thoroughly criticised, and that we shall arrive at the truth in reference to this matter of apples at different seasons, and perhaps in reference to the different varieties.

It is necessary that we should take this question of the apple industry into serious consideration. There is a little tendency, I believe, always and everywhere, to regard the fruit industry as consisting largely of small fruits and tender fruits. I can readily understand how that idea gains prominence even among fruit growers themselves. I was for many years particularly

interested in grapes and peaches, and to me those fruits meant everything; the mere question of an apple more or less, a barrel more or less, an apple crop more or less, did not matter much. But a wider survey of the industry has shown me fairly conclusively that the apple growers of Canada are in the majority in number at least, and I believe they are far in the majority as regards the amount of money invested in the industry. So far as the export business is concerned, the apple is everything, and altogether, I am inclined to think that if we value it at its true worth, whether as a producer of wealth or reputation for the country, we must regard the apple growing industry as the chief fruit industry of Canada. It is important that we should look at this matter in a large way, and I would ask those who are engaged in other lines—peaches, plums, grapes— to regard with a tolerant eye this matter of apply growing, so that we may as the Fruit Growers' Association of Ontario present a plan of planting, producing and selling the apple crop which will render it of greater national importance than it is at the present time.

With this question is included the consideration of the fall apple, which we emphasize this afternoon because it is perhaps the keynote of the situation. What are we going to do with fall apples? There was a time when these had little value in many parts of the country, and even yet in many places they are regarded as a waste product. On the other hand, we know of a few people, and of a few co-operative associations that are now, and have been, making more money out of their fall apples than out of their winter apples, which are usually considered to be the backbone, if not the whole thing, in the apple business. Neither of these views is right; the fall apple is not altogether worthless; neither is it more valuable than the winter apple, as would appear to be the case from the experience of a few of the more fortunate co-operative associations.

I want to present a clear idea of the place the fall apple occupies in the apple industry; then we shall have some guide as to where and how it should be planted, and how we should manage the growing of it. I will, therefore, endeavor to give the points in favor of these varieties, as well as the objections that can be urged against them.

I will not particularize varieties as that would lead to an endless discussion; I will not attempt to settle what varieties are fall, early winter, or summer varieties, further than this; let us agree that all apples, no matter what we call them, that have to be marketed before Christmas will class as fall apples, without distinction as to variety. The Wealthy is an early summer apple in Essex county and an early winter apple in Carleton county.

We are all agreed as to the many good qualities of such apples as the Colvert, Gravenstein, St. Lawrence, and, in many seasons in Southern Ontario, the Greening, (practically a fall apple in the Erie counties), and half a dozen other varieties. This includes some of our most prolific apples, and apples of the highest quality. The Gravenstein and Greening cannot be excelled in their particular qualities, either for cooking or eating. The Colvert is a splendid apple, prolific, of good quality, and a good carrier. The St. Lawrence, while not on our list, is an excellent apple, and if property handled, yields very large returns indeed. We can produce these apples at a much less cost per barrel, than we can produce the Spy. The market for these apples in Great Britain is opening up very rapidly. I am willing to stake my reputation that we can grow these fall apples in competition with the English growers, assuming that they also are growing for the English market. We can produce them more cheaply, and put them on the market

more cheaply than they can. We have, then, this unlimited market at our command if we will take certain precautions. In addition, the Northwest market is opening up for these varieties. The greater portion of our Dominion is there; it is developing rapidly, and notwithstanding a few adverse circumstances, the trend of immigration will continue towards this favored land, and we are by no means ready to supply the demand for fall apples that will come from there. Provided the apples are grown right, put up right, and are transported to the West properly, there is an unlimited market.

These apples are desirable because they are prolific; because they can be produced cheaply, and because there is an unlimited market for them. On the other hand, let me say that, so far as the local market is concerned, we shall always have a vast surplus of other fruits, as these apples come in with the later summer and fall fruits. We must always look for competition from other fruits in the local market; and I expect to see the local market flooded once in a while with these other fruits within the next ten or twenty years. They do well now, and will do well on the average, but there will be good and bad years in reference to these crops without a doubt as a result of over planting when the fruit is high priced, and under planting when we have a surplus. So far as the local market is concerned, the fall apple will rise or fall with these other fruits. The earlier varieties of apples will also interfere. There will also be competition with winter apples that are shipped at the wrong season. We shall always have these because growers who have not proper storage houses will not be prevented from marketing their fruit just as soon as there is any encouragement whatever to do so. While the present system of buying and selling is in vogue, it is also possible and probable that itinerant buyers will continue to buy these apples without any thought of holding them. I suppose that four-fifths of the apples bought in Western Ontario are bought to be shipped direct from the orchard either to Great Britain or the Northwest. The buyers have no thought of holding winter varieties until they are fit for market; but they take the varieties I have mentioned, together with Ben Davis and Spy, and harvest them all at the same time. Ben Davis, Spy, and Stark are going forward in large quantities now to the English market. It is in the interest of the apple growing industry of this country to take such means as may be necessary to stop this putting of the Ben Davis apple on the market at the present season. It is all right in February, May, June, July, but to put it on the market now is an outrage. These winter varieties that are going on the market at the present time will always be there to interfere with the sale of the fall apples. The period of cheap apples—when we will have a surplus of poor, second rate or wrongly marketed apples—will be from October 1st to Christmas. It is sometimes the case that apples will sell better then than they will in the winter time. I believe that last year the fall apples sold in the British market for as good a price as they did in January and February, but I do not believe it will be the case this year, nor will it be a normal condition of affairs.

That being the case, how are we going to divide on the planting of apples? Are we going to stop planting fall apples, and trust to the market being filled at that time with the remainder of the early apples, or are we going to provide definitely for the fall apple trade? My advice is to take the latter course and plant the most desirable variety of fall apples, and continue to plant them under favorable conditions and continue to improve our fall apple trade.

Just here let me say that the matter of locality has a great deal to do with it. Where is it desirable to plant them? Where can we grow them best? I would not advise planting these apples in the apple belt extending from Belleville to Lake Huron north of Lake Ontario, and continuing through south of Wellington county to Brantford, going through to Lake Huron and extending along the coast of Lake Huron. This region is specially suited for the winter varieties of the Spy and Baldwin groups. It would be a mistake for any man in this district to plant fall apples as a commercial speculation. In this section plant winter varieties and produce fruit that can be grown to greater perfection here than in any other part, I believe, of the American continent. This region can produce winter apples from 25c to 50c per barrel cheaper than in any other part of the American continent.

On the other hand, I would not advise people living on the shores of Lake Erie to plant winter apples, but fall and early winter varieties. If I were in that section I would plant very early varieties, and along with these, for larger orchards, fall varieties such as those I have already mentioned.

I say it would be a mistake to plant winter varieties in this southern tier of counties. They are in no better position than are the people of New York State to grow these apples. If these people who are living in the belt I first described have an advantage of 25c to 50c a barrel—remember that is from fifty to one hundred per cent. on the cost of production—it is an enormous advantage, an advantage which if a manufacturer had, he would simply monopolize the whole market, and I believe that part of Ontario can practically monopolize the export apple trade of the continent in fall apples.

I want to say one word of warning, the early apples will not be profitable unless they are grown with far more care than is necessary for winter apples. You cannot grow them with the same indifference to scab and fungus, and to packing and methods of marketing, that you can winter varieties. You must have clean culture, and spraying must be more carefully attended to than with winter varieties. These apples must also be packed in boxes for the best profit, and they must be treated, not as an article of luxury perhaps, but as something of greater delicacy than the ordinary run of market apples. They will not stand shipping in barrels nor will the market stand it. If you are going to make the most of the fall varieties, you must grow them more carefully than winter varieties, and give much more care and attention to the details of packing.

Q.—I come from one of the Lake Erie counties (Norfolk) which you recommend for fall varieties. Suppose I were a young man, and intended planting a commercial orchard, what varieties would you recommend for me to begin with.

Mr. McNeill: I would not plant a winter variety, except perhaps the Ben Davis or the Stark, and I would recommend these only because, so far as my experience goes, neither of these apples would be too mature to keep well with ordinary care. You could keep these apples in ordinary storerooms such as any man could provide, and could be reasonably sure of having winter apples for sale in February or March, and no large percentage of loss. On the other hand, if you attempted to keep Spys, they would, in an open winter, show a loss of from 10 to 35 per cent. when you came to repack them. If you plant early apples and fall apples, you would get more for them, if you handle them as I have indicated, than you would for the winter varieties even if you had them to perfection.

Mr. Jas. E. Johnson, Simcoe: I am glad to know Mr. McNeill has acknowledged that we have agreed to disagree. As to the planting of fall varieties in Norfolk county, I should certainly object to it. Mr. McNeill has a fruit farm in Essex county, I understand. I consider that the climatic conditions in Essex county and also in the Niagara district are entirely different from Norfolk county. The season of blooming is much later with us. The fall apples such as Duchess and Wealthy ripen at a season of the year when it is still very warm. We have a far warmer climate than in the Georgian Bay district, and the season of picking these early varieties is not nearly as well timed in Norfolk county as it would be farther north. I think that these varieties grow far hardier in the north, and if I had land along the Georgian Bay and were planting fall apples at all, that is where I would plant them. What are the conditions in the United States? In Michigan, the fall apple section is around Traverse City; in Wisconsin no fall apples are grown with any success south of Reedsburg. In the northern part of Iowa, they raise large quantities of fall apples. We must also bear in mind that enormous quantities of fall apples are being set out in the States I have named, and the fruit produced there will come upon the market at about the same time that our own fruit does. Fall apples from those States are now being shipped to the Winnipeg market in the proportion of four or five cars to our one. Last year the growers in Michigan and Wisconsin got $1.25 a barrel picked, and it cost $1.20 per barrel, duty and freight to place them on the Winnipeg market. As I have said, the acreage being planted to these varieties is very great, and at the season of the year when they come in, it does not take a big percentage to fill the market as there is so much fruit to be had.

In Norfolk county, suppose we had nothing but these fall apples, and there was a large crop in the States named? I do not think we should realize much on our crop. There is also the possibility of warm weather at that season of the year, in which case, if the fruit is delayed for a few days, as it often is, it arrives in poor condition. That is not the case with winter fruit, which will stand far more punishment. Therefore, taking the acreage into consideration, I should feel very much opposed to the growers in Norfolk going into these varieties when they can grow Spy, Baldwin, Greening, and perhaps King—although I do not recommend that on account of its shyness in bearing. They may not keep as long as some others, but I can get 50c. a barrel more for well colored Spy apples in the months of January and February than early varieties will bring. It will pay me to grow them in preference. Those are the varieties I consider we should stick to in Norfolk—that is, those who set out five or six acres. I am putting out a large orchard, and have planted McIntosh, Baldwin and a few Fameuse. I consider there is no apple grown to-day that will make the money for the grower that the Baldwin will. We have in our locality an orchard consisting of four acres of Baldwin, one acre of Spy and one of King. This year the Baldwins yielded about 200 barrels to the acre. The Spy trees yielded 200 barrels this year and about 125 barrels last year; the Kings, 120 barrels last year and 112 this.

Q.—That would give a net profit of about $400 per acre?

A.—About $2,800 on the six acres.

I should like to know how they can grow these apples cheaper in the belt Mr. McNeill mapped out than we can. We have different orchards there of five or six acres that have yielded from $1,200 to $1,500 to the growers. The orchard to which I referred has had the best of care and is

a great object lesson. I draw the attention of every member of our Association to it, and I believe it will result in all our orchards receiving far more care than in the past. Up to six years ago, it was very uncommon to hear of spraying, and orchards were neither cultivated, pruned nor fertilized. Last year we had seventeen spraying outfits in our district; this year, there were in the neighborhood of fifty. This is about the way we are developing. Up to three years ago the farmers thought very little of their orchards; after the last work was done they would attend to their orchard; now the first thought is to the orchard; they are beginning to see the money there is in it.

Speaking of Ben Davis, I would not recommend the planting of that apple. It has been planted largely in Missouri, Illinois, Kansas, Arkansas, Colorada, Montana, and there are a good many in Ontario. It is a good keeper, but very few people hold it in their cellars for their own consumption.

This year is one of the best in fall apples that I ever saw because the crop is short all over. Our sales netted us this year in the neighborhood of $2.85. We should not have realized quite as much if we had not had a retail market to ship them to. Our winter fruit this year realized from $3 to $3.25 a barrel. That shows the increase even though there is a larger supply of winter fruit in proportion to what there was of fall fruit.

As for the Greening, I have a great regard for that apple. I consider it the best cooking apple of the day. Bakeries in the large cities buy them as long as they are to be obtained. I should favor very much the setting out of quite a number of Greenings. They should not be picked too early in the season but left until they are mature. If we set out a lot of Wealthy and Duchess and the markets are flooded, what are we to do with them?

Mr. McNeill: Ship them to the Old Country.

Mr. Johnson: What are we to do with the culls? The canning factory is busy with vegetables and other fruits, and cannot handle them. They do not make good stock for evaporating. Therefore we have to ship what are good, and either feed the rest or let them lie. In a few years when the orchards that have been so largely planted come into full bearing, Mr. McNeill will be very sorry that there were so many early varieties.

The Chairman: We should like to know how the two kinds compare in value, both by the acre and the tree.

Mr. W. H. Dempsey, Trenton: During the last twenty years, on the average, I have received more money per acre and per barrel for the fall apples than for the winter—Duchess, Wealthy, Gravenstein, Snow, Trenton, McIntosh—these coming in before December.

The Chairman: With your experience would you plant more fall than winter apples?

Mr. Dempsey: I do not know that I would; I would not plant an orchard of any size with apples for the fall season.

Q.—What fall apples would you plant?

A.—Those I have named, and in certain locations, I would put in Blenheim.

Q.—How would Ribston do?

A.—There are very few cases where I find it doing well.

Mr. Sherrington: I think it would be a serious mistake for those living in the favored districts for winter varieties to plant fall apples. I live in a district favorable for the production of Spy, Greening, and apples of that class, and I for one would not think of planting fall apples, when I could grow better and finer varieties that will pay me better. But there

is a place for the fall apple, and there is going to be in the future more than at present, but they require a better system and more careful packing than winter apples, and will likely be handled in boxes. We have, in my experience with our association, a strong market for fall varieties, and it is not necessary now for us to waste any summer or fall apple if it can be quickly transported. With these things, we are receiving just as profitable prices as for winter varieties; but in the southern sections where they cannot grow winter varieties with the same keeping qualities as we can, I would prefer the fall varieties.

J. L. Hilborn, Essex County: I think that in our district there would be money in growing early varieties, principally Duchess, which produces remarkably well and colors earlier perhaps than anywhere else in Ontario. These may be followed with apples of Gravenstein class, which do much better with us than in colder districts. Greening is practically worthless on the soil along the lake where I live, as it does not thrive. What Mr. McNeill stated regarding the winter varieties is exactly in accord with what I have observed: that Ben Davis and Stark do grow well there and seem to be a better quality—they mature and develop better—than farther north; and they are about the only apple that will keep well till spring. I do not think it would be profitable to undertake to grow standard winter varieties in that locality.

Mr. Macoun: It seems to me that in this discussion the point of view of the Northwest fruit grower has not been taken into account. Any of you who have paid careful attention to the work of Dr. Saunders will know that he now has about 200 varieties of cross-bred apples that are perfectly hardy in the West. I feel perfectly confident that when we get two additional crosses, there will be apples, two or three times the size, that will be hardy all over the country. If so, in 25 years from now, there will be many orchardists growing summer and fall apples in the West to supply the local demand. Dr. Saunders has laid a splendid foundation for Northwest horticulture.

Mr. McNeill: I heartily agree with what Mr. Macoun has said, and am glad to endorse his tribute to Dr. Saunders' work. I think that the work he is doing should be recognized by all fruit growers, if only from a scientific standpoint. They should see to it that this work is not only adequately recognized at the present time, but that ample provision is made for carrying it to completion when he is compelled to leave it.

Even supposing they do grow these apples in the Northwest, our apples will be marketed and consumed long before theirs are ready. In Essex, Red Astrachans ripen by the 20th July, and would be marketed by the time these western apples are nicely through blossoming, so that no one in the southern counties need be afraid.

I would not advise planting early apples in the north. They have been planted in the north because many of them are exceedingly hardy and are the only apples that will grow. They have been planted not because they are early but because they are hardy; they do not compete with us because there they become fall apples. The fact that they have been planted in the north makes it possible to ship Duchess apples to Great Britain from August 1st to September 1st and always in their prime. To have that length of season is a great market advantage.

I heartily agree with everything Mr. Johnson said in reference to the apples of the southern counties. I do not want to be misunderstood on one

point: If you have winter varieties do not cut them down. It is a distressing condition that people should be so unintelligent as to destroy property worth from two to three hundred dollars per acre simply because they are not willing to learn how to handle the product, as they have done in Norfolk county and elsewhere. Mr. Johnson has done a remarkable work in the interest of fruit growing. By organization, apples that were formerly worth only 50c. a barrel are now bringing from $1.50 to $2, and for this you have to thank Mr. Johnson, who has created wealth as truly as if he had taken it out of the soil; more truly, indeed, for he has taken these thousands of dollars out of the earth and the earth is no poorer for what he has done. (Applause).

Mr. PEART, Burlington: Mr. McNeill's address was based of course on general principles. I do not doubt for a moment his statement that early apples should be grown in the southern parts of the Province, but I would not think of limiting southern growers to those varieties. Where I live we plant not only summer and fall apples but winter apples. We plant Duchess, Ribston Pippin, and King; also the winter apples, Spy, Baldwin and Greening. When I am asked a question as to what varieties to put in an orchard, I usually answer it like this: There are no two localities that will grow the same sorts of apples with equal profit. There is great variation in farms and a greater variation in localities. If I were asked that question by a young man in my district, I should probably point to several of the leading varieties in that district, which I know from my experience have made money for their owners. So in other localities. My advice would be: go to a successful apple grower of experience in your locality and ask him what varieties he would plant; follow his advice and you will not go far astray.

Mr. JOHNSTON: I look for Baldwin and Spy apples to sell for more money in the future even than they are selling for at the present time. Very few have been planted in Southern Ontario or in Western New York

Mr. HAROLD JONES: Speaking as a practical fruit grower, I think we should be a little cautious about too many early varieties. We must remember we are handling a perishable product. If we overproduce the more perishable part of an already perishable product we shall suffer in the end. Early varieties come into bearing at an earlier age than the winter varieties; therefore you are liable to have over-production of this class of fruit quicker than in winter apples. Early varieties have been planted quite largely in the last few years. In the St. Lawrence Valley there are no winter varieties being planted.

Mr. MCNEILL: I would not plant them there; but there are no winter varieties being planted in Southern Ontario.

Mr. JONES: We do not want it to go forth that this Association recommends the wholesale planting of early varieties through the Province.

Mr. MCNEILL: Certainly not. Commercial orchards of early apples should be planted in Southern Ontario only.

GREAT BRITAIN AS A MARKET FOR CANADIAN FRUIT.

By J. A. Ruddick, Dairy and Cold Storage Commissioner, Ottawa.

While we naturally look to Great Britain as the chief export market for all kinds of fruit grown in Canada, we must not forget that the home market is an important and growing one, especially in the North-West. While the future may see apples grown successfully in sheltered localities in the prairie provinces, there are, and probably always will be, limits to the growing of fruit in the west this side of the mountains. It seems to me that it is hardly worth while trying to open up a market in Great Britain for tender fruits, tomatoes, etc., when there is an extensive market for those fruits within our own borders. The shipment of tomatoes is a little difficult, because the cold storage of tomatoes is not very satisfactory. This is a matter about which I have recently been making enquiry, and I learn from large warehousemen in different parts of this continent that they have never been very successful in carrying tomatoes in cold storage for long periods, except in a semi-green condition. The tomato seems to keep best in cold storage when about half ripe judging by colour. The trouble is that they do not ripen properly when taken out of storage.

Q.—In what shape should they be shipped?

A.—The demand in Great Britain is for a small, solid, smooth tomato, rather smaller than what is asked for in the market here. They receive them as a general rule in packages containing from four to six quarts.

Q.—Are the packages similar to the Georgia package—four small baskets in a tier?

A.—I am not acquainted with that package. Tomatoes are grow under glass extensively in Belgium and Holland for the British market, but the supply does not equal the demand. The retail price last September was 4 cents a pound.

Great Britain will take all the first-class produce that we have to offer. There are frequent agitations in favour of opening new markets for many things of which Great Britain is ready to take all we can produce. Thus, I find dairymen looking for a new market for cheese, although so far Great Britain has been willing to take all the cheese we could produce and pay as good a price for it as can be obtained anywhere. It is the large quantity of cheese which goes to that market that helps it to retain its place there. I think it is a mistake for Canadian apple growers to look elsewhere for a market so long as Great Britain will take all that can be produced. The larger the quantity, the more important the item becomes, and the more attention there is paid to it. If there is only a small quantity of a product, it is swallowed up in the great mass of stuff coming from all parts of the world. I do not think we have fully exploited the British market even with our apples. While every dealer is willing to admit that the Canadian apple is the best apple on the market, much better prices might be obtained on the average if we gave more care and attention to packing and general appearance. I have seen home grown apples selling at four shillings a dozen in England. It is reported that apples shipped from Oregon last fall netted the growers $1.32 per box f.o.b. These apples are admittedly inferior in quality to Canadian, but are put up in better style.

There are considerable quantities of Tasmanian apples now coming to the British market, and we may meet with some competition in that direction, but they do not compete with ours in quality, nor do they come in at the same season. They are being received, however, with a fair amount of

favour by the dealers. In placing any article of produce on that market, the dealer is a very important man to consider; the man who retails the goods is an even more important man to consider than the consumer. You must please him, and give him something he can sell at a profit, or he will not sell your product, but buy something else and place it before his customers in preference. He is more interested in pushing a line of goods on the market than the consumer is in asking for it. To show that Canadian apples are in favour on that market, I wish to draw your attention to the difference in price between Canadian and American fruit. One of the leading firms reports on the sale of two consignments, one American and the other Canadian, sold on the same day in which Canadian Baldwins brought one shilling and sixpence, Greenings, two shillings and sixpence and Kings, four shillings and sixpence more than the same varieties of American apples. When I was in Liverpool last September, the Fruit Brokers' Association asked me to meet them. The meeting was a very interesting one, and I was glad to learn that they were more than pleased with the improvement that had taken place in the condition of Canadian apples arriving at that port since the introduction of the Fruit Marks Act. The confidence thus created is worth thousands in the case of Canadian fruit growers. The purchasers have greater confidence in Canadian apples than in American apples at the present time, and this accounts to some extent for the difference in price already mentioned. In the case of the American apples none of the packages bear less than three X's, some four or five, and I have seen as many as fifteen. The number of X's does not affect the sale of the apples at all, for they pay no attention whatever to the marks on the American packages, but they do pay some attention to the Canadian marks. They do not rely on them entirely, but the fact that the quality of the fruit is, on the whole, up to the markings, has increased the confidence of the buyers.

Q.—Is not the Canadian barrel larger?

Mr. RUDDICK: Some of the American barrels are as large as ours. Those of you who are familiar with the Englishman's character know that he objects most strongly to being imposed upon in any way. My experience with people over there is that on the whole they are ready to deal fairly, and they want to be dealt fairly by. I do not know of anything that will more quickly disgust and turn the English dealer and consumer against a product than anything in the nature of misrepresentation. That is where the importance of having our apples packed and marked according to grade comes in.

With regard to the inspection of apples, I have heard it argued that this should be done at the point of shipment and not at the port where the vessel is loaded. The onus of packing and marking correctly rests on the packer, not on the Inspector or on the Government, and it is certainly in the interest of the packer and the grower that every confidence should be established in the grading and marketing of apples. Judging from the arguments one hears in his connection, many appear to think that if they could only market their apples as No. 1, even if they were really No. 2, they would be that much ahead. In reality they lose rather than gain by such a practice, because the apples are sold on their merits if the marking is not correct, and it is the greatest possible folly for packers to follow the practice of overgrading their fruit. The best evidence you have that you cannot raise the market value by marking apples No. 1 that are in reality No. 2, is in the marketing of American apples. I am pleased to say that the practice of overfacing is practically a thing of the past.

Q.—Does not the system of grading discriminate against the home consumer?

A.—Does not the home consumer get the same protection?

Q.—The product for the home market does not need inspection nearly as much.

A.—That is quite true. The argument I am trying to make is that the responsibility does not rest on the inspector but on the man who packs and markets the fruit.

A word or two as to the commission business. I had an opportunity of meeting the Liverpool brokers as I have stated. A few lots of Canadian apples were in at that time and also some American. I am not going to discuss the merits of this system of marketing fruit; that is one on which there is room for a difference of opinion. My own idea is that if I had apples to sell I should not like to ship them to Liverpool on commission; I would rather sell in this country and get the money. One point is worth referring to: It has been argued in some quarters that it would be better to have the auctions or distributing centres at various points throughout England and Scotland. The principal distributing points now are Liverpool, Manchester, Glasgow, London and Bristol. While there may be something to be said on both sides, it seems to me that the point at which fruit should be sold is the point of discharge from the steamer. Supposing you have 20,000 barrels of apples to sell, I think it better that they should be offered for sale at the large centre and have 400 buyers bidding on them, rather than to offer 10,000 at one point and 10,000 at another and have only 200 buyers at each place, because the competition is keener with the large number of buyers. The smaller market is more quickly and easily glutted than the larger one.

While in Great Britain last summer, I had some opportunity of discussing other phases of the fruit trade. One firm in Glasgow, which imports canned apples and pulp for jam making, pointed out one thing that is worthy of notice in connection with canning apples. Their greatest complaint was that there was not sufficient care observed in sorting varieties when they are put into cans. They found different varieties in the same can, the result being that while some were insufficiently cooked, others were reduced to pulp. They also pointed out that there was a great market for raspberry pulp. I do not know enough about the business to say whether you can go into the exportation of pulp or not. This firm imported 250 tons of raspberry pulp from Tasmania last year. There is a tremendous market for that class of product.

The question of cider and cidermaking is of some interest. I spent some time in visiting different cidermaking districts. I was not there at cidermaking time, and did not see the industry in full operation, but I saw and tasted plenty of cider. The quality is not quite so fine as some of the Normandy cider, but it is fine enough to be sold in some quantity as low grade champagne. As I understand it, there is little real cider made in Canada. Most of our so-called cider is simply doctored apple juice, and it has given Canadian cider a bad name in some quarters. In certain districts of England, the industry has been carried on for hundreds of years, and is very well established. They grow apples specially for the manufacture of cider. The cider apple is quite a distinct kind, and some of the orchards I should think are two hundred years old. The trees are of enormous size and bear large crops of small bitter apples, which are not edible in the ordinary sense. They are supposed to make the best cider, but other kinds are used also. One maker in Norfolk told me that the finest cider he had ever produced was made from Canadian apples and that it took second prize at the Bath and West of England show. Canadian cider is also imported and used for blend-

ing purposes. I am not prepared to say that Canadian growers can make cider and ship to Great Britain with profit at the present time, but there is evidently a demand that cannot be supplied locally, and in consequence there is a great deal of adulteration going on.

As far as I could learn, Canadian cider would bring sixteen or seventeen cents per gallon laid down at Liverpool. The freight would be about four cents per gallon from Western Ontario. You can decide whether it would pay at that price. Some makers say a barrel of apples will produce nine or ten gallons of cider.

Mr. SHERRINGTON: Nine gallons to a bushel and a half.

Mr. RUDDICK: That would be pretty high. The yield is from fifty to seventy per cent. of the weight of the apple according to variety. I think this is a matter that the fruit growers might very well consider. There is evidently a market for well made cider, i.e., the fermented juice of the apple. I am not prepared to make any announcement as to what the Department of Agriculture would be ready to do in the matter, but I shall be glad to hear from the fruit grower as to whether they need help in this industry or if they think it is worth helping. There are a large number of cider mills throughout the country but there is little real cider made, because the fermentations which are necessary for the production of cider are not under proper control. For one thing, mill operators will have to keep their premises cleaner and more sanitary than at present, before they can secure and control the proper fermentations. Everything about an English cider mill is thoroughly clean, and the greatest possible care is taken to prevent a wrong fermentation taking place.

The Board of Agriculture has established near Bristol what they call the National Fruit and Cider Institute. They give a great deal of attention to the manufacture of cider from single varieties of apples, and they find a great difference in the different varieties, not only in reference to the quality of the cider, but in regard to the fermentations that take place. English cider makers claim that to make cider in large quantities would be to destroy one of its peculiar qualities. They find that the individual maker is able to produce certain qualities that add very much to the pleasure of drinking the cider, as the little difference that exist are always of interest to a man who is a cider drinker. Not many farmers in this country would be prepared to carry on the manufacture of cider on the same scale that it is carried on by the farmers in Great Britain. The cider would never be made in Canada from choice apples but from the poorer fruit. If a large proportion of this inferior fruit was excluded from our export fruit, it would at once raise the standard of the apples that are offered for sale. One cider maker in Great Britain told me that he was able to make as much out of his inferior fruit by turning it into cider as he could get on an average for all the fruit of his orchard.

I have fully introduced this subject without going into deails, for it is a very large subject. I wanted simply to bring the matter before you and to say that, if the fruit growers are desirous of taking up this industry in a systematic way, I think the Department of Agriculture at Ottawa will be ready to assist in its development.

Mr. SHERRINGTON: Do you think that the Tasmania apple is going to come in competition with our product?

Mr. RUDDICK: It does not come in at the same season of the year, but if they continue to increase their production, as I am given to understand they will, the competition may be felt to some extent.

Mr. Sherrington: A dealer told me that we need not fear competition from Tasmania, as the fruit is all consumed before we make our first shipments, and the quality is quite inferior to ours.

Mr. Ruddick: That is so, but if the production is increased, the season will be extended for Tasmanian apples, by holding them in storage. As these apples show excellent keeping qualities, it is quite possible that there may be some over-lapping of supplies. The possibility of competition from Northern Italy is also to be noted. I saw apples from there selling at a fairly good price although small and inferior. They are packed in a light basket that holds about half a bushel, and are beginning to be placed on the market in quite large quantities. There is about as progressive a class of farmers in Northern Italy as you will find anywhere, and if they go into the business extensively, it may mean more direct competition than that of Tasmania or New Zealand.

Mr. E. D. Smith: With regard to the Fruit Marks Act, I believe it has a value to the shippers here, and I have always felt proud that this Asociation was largely instrumental in securing the passing of that Act. It has been of very great value and will be of still more value when fully enforced. At present there is nothing to prevent a man evading the Act by shipping by New York or Boston. I know of cases where the worst sort of trash was shipped in that way and marked No. 1 and No. 2 This stuff injures our reputation on the English market. The main object of the Act is that fruit may be sold on the marking of the packers; that we may have a uniform article to put on the foreign markets. We have not yet reached that stage, but I trust that in a few years such a result will have been accomplished.

With regard to inspection at the port of embarkation, Montreal does not receive one-quarter of our apples. That is one of the main reasons why there ought to be some inspection at the point of shipment, if a man wanted it, so that he can sell his apples as having been government inspected. I hope that sometime the provisions of the Act will be extended to cover this.

Mr. Tweddle, Fruitland: I think the fact that fruit is shipped *via* New York and Boston from Southern Ontario points is one that should be taken notice of. We can often get cars to ship *via* Buffalo, whereas we cannot get cars to ship by Montreal. I do not suppose that these apples are inspected at all. I should like to see an inspector at Fort Erie for instance. If there are any buyers in our part of the country who want to get anything through that is not graded according to the Act, they now have every opportunity of doing so.

Mr. Sherrington: If our apples could be inspected at the point of shipment, we could close our deal at that point, and would not have to meet complaints that the fruit was not as represented. Sometimes the dealer is unscrupulous; sometimes deterioration takes place through delay by the transportation companies. This would overcome a difficulty we have with some dealers in distant markets. If the inspection staff could be increased so as to admit of local inspection at the apple shipping season, it would be a great help to co-operative associations. Perhaps it would be possible to have apples inspected on arrival at their destination in cases of dispute.

Mr. Wm. Rickard, Newcastle: This is a matter that can be regulated by the contract entered into. I think I know as a grower and shipper what kind of a contract I want. I sell my apples for so much f.o.b., and the contract is closed. There is no question of any inspection. If you want to inspect, do so before we load the car. I have sold car after car without inspection and never had any complaint afterwards. But if there is to be

any inspection, that is the time to make it; then close your contract, and get your money through the bank.

I think the growers will recognize that if every package of apples put up in this country is to be inspected before it is sold, it is a gigantic undertaking, and would cost an enormous sum of money.

Mr. SMITH: My suggestion is that the inspection at point of shipment should be at the expense of the shipper. Apples sold by a commission merchant do not require to be inspected, because they are sold on their merits; neither would it be necessary to inspect apples for the Old Country at the shipping point, although many shippers would like to have it done. If I were buying a car lot from a stranger, I would be quite willing to pay the cost of inspection, and it would not be a very serious undertaking. The inspection of every barrel would not be required, sample barrels would be taken. I think that many shippers would be glad to pay a small charge if it were necessary.

With regard to export apples, I should like to see the inspection extended to Niagara Falls and other similar points through which shipments are made via United States ports.

Mr. LICK, Oshawa: Would it not be possible to have three or four inspectors placed in Ontario, who could move quickly to different points so that the Asociations would not know when the inspector is coming. Perhaps a little more of that kind of inspection would overcome some of the difficulties complained of.

NURSERY CONTROL FROM THE NURSERYMAN'S STANDPOINT.

By E. C. MORRIS, BROWN'S NURSERIES.

I have been asked by your committee to prepare a paper on the subject—"Guaranteeing Nursery Stock." Last November this subject was discussed by the fruit growers, but the ones engaged in both fruit-growing and the nursery business did not discuss the subject, I am told. As for myself, I was not in attendance at the time. (Extracts following are taken from annual report, 1905.)

At this meeting, fruit growers express opinions as follows: Mr. G. A. Robertson illustrates: "When he (the fruit grower) ordered Elberta, he got white-flesh peaches." I should like to ask Mr. Robertson does he know of an actual case of this kind? Did the nurseryman intentionally deliver white-flesh peaches? I do not believe the nurseryman did so intentionally. No nurseryman in this day and age would dare to do it—not for fear of the law but for his own business success. Only a few years back, there was no fruit industry. Buyers of nursery stock and growers of nursery stock were careless: to-day all is changed. Mr. Robertson suggests "pedigreed stock." In theory or on a small scale this is practicable, but not in a large commercial nursery; processes are too slow and expensive as well as uncertain on account of fruit buds. All nurserymen, so far as can, buy Tennessee natural pits for their peach budding stock.

Mr. Peart says: "I have bought a good many thousand trees, and not more than 5% have been untrue to name. If the nurserymen will replace the varieties that are untrue to name or will top graft them or replace them in some way, I think it is all they can be expected to do." Nurserymen think Mr. Peart's views are nearly right. If you will drive through the fruit dis-

tricts of Canada you will not find 5% of all the millions of bearing trees turning out untrue to label, and suppose 5% or 10% did turn out so? Has the fruit grower lost money on his investment? No, he has not. If he had, the planting of fruit trees would cease: it has not, but is on the increase. This fact proves beyond question that the loss on this account is small and even in the face of it, the fruit growers' land is producing ten times in fruit what it did in farm crops. Thousands of acres of land would not to-day sell for over $70 an acre, were it not for the few hundred dollars of fruit trees planted thereon. These trees have raised the price of the $70 per acre land to $300 and $400 and even $500 per acre. On the whole, it does not look as though the "untrue to label" tree has worked a general hardship. It certainly would be delightful to have all trees planted grow and turn out "true to label." Twenty-five years ago last April I first started in the nursery business, and from that day to this I do not believe I have met six men who would acknowledge that they were at fault for trees dying or were mistaken as to the varieties ordered and got, until they were shown their original order. There are as many misclaims regarding varieties ordered and got as trees that turn out untrue. You may think that a wild statement, but it is a fact, which can be proven.

Mr. Rickard said: "I have been in touch with a great deal of planting of apple trees, and I think there is practically no loss from the trees not being true to name."

A Member said: "In my part of the country it makes comparatively little difference as regards apple trees, whether true to name or not, as they can be top-grafted."

Mr. Caston said: "Everything I have got in a commercial way from nurserymen has been true to label."

Mr. W. L. Smith referred to an orchard where "1-5 of the trees obtained from one of the largest nurseries of Canada proved wholly valueless." Mr. Smith does not say on what ground the 1-5 of the orchard were valueless. Was the then present owner of those trees the original purchaser of them, or did he buy the farm with orchard planted thereon, and take the former owner's word for the varieties it contained. Did Mr. Smith see the original order, or an exact duplicate, to know for himself before pronouncing his judgment? I ask these questions because experience has taught me that very often through the fallibility of memory, purchasers are mistaken, and forget and then make erroneous claims and statements. It takes very few trees eight or nine years to show whether it is the variety ordered or not, and the very first spring after a tree shows it is not right is the time to top-graft and not wait until eight or nine have passed. Then when he has top-grafted his tree, or budded it, the chances are 3 to 1 for even a stronger producer, had the tree been true at the start.

Nurserymen and seedsmen are in the same relations to this subject.

Your committee presented the following report—in part:

1. "It is a fact that much of the nursery stock planted in years past has been of inferior quality and untrue to name." I challenge that statement "that much of the nursery stock planted, etc.," That word "much" should be defined. Mr. Peart, an extensive fruit-grower, says, "not 5%"—that certainly is not much. A 95% yield of any crop is excessively large. A 95% sale of all manufactured products of any mill is very large. All loss that has fallen on the fruit-grower has been shoved off on the nurseryman, simply because the fruit grower will not act along the proper lines, to save himself from as much loss as possible, by top-grafting his trees. We hear a good deal said about five, six or eight years lost time, etc. It is a pity that

some growers do not think of that when they put the block and tackle to hundreds of bearing trees and pull them out, simply because the price of that class of fruit has gone down for a year or two, because, "they do not pay any more." He forgets that hundreds of others are doing the same, and the day will come when that fruit will go up. These eight or nine years lost are not counted in the fruit grower's profit and loss account. Oh! no. Because that's his mistake. But it's awful when 5% of his trees turn out untrue (and he could save the larger part of this loss if he would), and the other 95% are yielding him 1,000 to 1,500% profit on his investment, and have sent his $70 per acre land to $300 and in some cases $500. No, that does not amount to anything; we want the whole 100% perfect.

As for a Remedy.

From the foregoing, you will see, that in my estimation, as well as in the opinion of some of our best fruit growers, there is occasion for complaint about a very small per cent. of the total trees planted. It, however is so small a percentage of the whole that there certainly does not exist any alarming demand for immediate action or stringent legislation. Putting nurserymen under a bond accomplishes nothing. There is not a nursery of any size in Canada to-day that is not good for all its liabilities, and a bond does not make it one whit easier to collect damages, as you must sue the bond first and prove damages. Licensing agents accomplishes nothing. People to-day are wise enough to know what to believe and what not to believe, and if they are not informed it is very easy to inform themselves from the very clear and concise circulars issued by the experiment stations. Any man can get a license to sell trees, and without an examination as to his moral standing or veracity. This would not raise the standard at all. Common sense used by customers will protect them more than anything else. To pay 25c. for a tree, grow it three years, and then expect a nurseryman to pay $5, $10 or $25 damages where a tree turns out untrue, is not a fair proposition, as the earning power of that tree depends upon more than its name or the quantity of fruit it might produce. Prompt and proper planting are very essential to a healthy orchard. A higher price could be fixed at which stock could be guaranteed, but that price, if general, would cut off all planting. I would like no better paying venture than to buy trees at 25c., grow them three years and get $5 damages per tree; it would pay even then better than farming.

Some two years ago the United States Congress was surprised to find a Bill introduced to regulate traffic in trees and make nurserymen responsible for correct labelling. The introducer of that bill was more surprised than Congress by the reception he got. The bill was never mentioned a second time. There is no state law that I am aware of that is enforcible on this point. Some states have license and bond laws, but the fruit grower does not receive any direct benefit. It simply adds to the cost of trees, and the fruit grower must pay it in the end. Nurserymen are to-day far more careful than they were, and competition will clear up the trouble quicker than anything else, as those mistakes and mishaps hurt the nurserymen more than the grower, and so they should to make him careful.

With all the trees that turn out good, and with all the trees that turn out bad, the nurseryman suffers, too. He suffers no inconsiderable loss from tree purchasers being mislabelled,—marked "good pay" by local parties. But, that is the other side, and it only goes to show that we are all liable to mistakes. But please credit the nurseryman with a fair amount of honesty

and good intentions, and if any new legislation is deemed best, consider his interests, his problems, and his losses, as well as those of the fruit grower. Our interests are mutual.

Help the nurseryman by paying a fair price for his produce, and I know that he will do his part toward delivering to you trees true to label. It is to his interest to do it, without any further legislation.

NURSERY CONTROL AND LEGISLATION IN OTHER COUNTRIES—FROM THE FRUIT GROWER'S STANDPOINT.

By G. A. Robertson, St. Catharines.

I am very sorry that the writer of the foregoing paper is not present. I showed the writer the trees on my place, going over the orchard carefully and giving him full particulars as to the Elberta trees to which he refers. I do not wish to make this discussion personal, but I will say that some nurseries not two thousand miles from here, in appointing agents in the Niagara district, have a hard job getting men to sell stock in the locality in which they live and where they are known.

The growing of fruit in Ontario, dates back quite a few years, but it is only of somewhat recent date that it has been taken up as a special industry. Many of the older growers can recall the varied experiences in the growing and marketing of the tender fruits when first introduced, and the growth has been steady until to-day many of the growers are specializing along certain lines. The haphazard methods of planting seeds to make bearing trees, has given place to the better method of budding and grafting by taking buds and scions from some known variety, and using proper root stock to nourish these buds and scions which will in time become the bearing tree, and the steady demand for such stock is accountable for the existence of the large nurseries of to-day.

In the endeavor to get something better, to get something hardier, and to increase the length of the season for certain fruits, it has been necessary to introduce some new varieties grown in other countries, and as the business of fruit-growing becomes more centralized, we find every year some new insect and fungous pests, and many of these infestations are traced to the distribution of nursery stock, until to-day different countries have legislation for the inspection of nursery stock, and adopt fumigation as a preventive measure of further insect infestation. With the advent of these numerous pests, it is no longer a question: "Does spraying pay?" It has become an absolute necessity, and the work must be done thoroughly, and to-day in many districts may be seen fields with trunks of dead and dying trees, many grown up with weeds which mark the place where perhaps only a few years ago was an orchard which bore heavy crops of fruit, but is now dead because of the want of proper care.

This increased cost of caring for the orchard necessitates the removal of all weak and unprofitable trees if we are to make a financial success of the business. It has also directed attention to the removal of all unprofitable varieties and forcibly reminds us of what in former years we overlooked, namely, the varieties planted being untrue to name.

When I came in possession of my present premises, there was on it a thrifty young peach orchard of some thirteen hundred trees. At the close

of my first season the former owner offered me a chart of the orchard, which called for some three hundred trees at one end of the orchard of the variety known as Early Rivers, while there was not an Early Rivers tree in the orchard; and the varieties were so mixed that it was necessary to go over the whole orchard during the entire ripening season so that none should be missed.

My next experience was with cherries, and I placed an order for four hundred trees, fifty of each of the following varieties: Governor Wood, Knight's Early Black, Napoleon Bigarreau, Elkhorn, Windsor, Black Tartarian, large fruited Montmorency, and Early Richmond. The Governor Wood were about one-third true to name, the others are mixed varieties, many of them black, later ripening, and some are unprofitable. The Knight's Early Black are conspicuous by their absence, not one of the fifty trees are true to name; but have proved to be a later sweet black cherry, many of inferior size, a very shy bearer, and ripening along with the Black Tartarian. I got a large cherry grower to visit the orchard, and his advice to me was to cut them down, as he had some of the same and they would never pay. This is my reward for eleven years of care; manuring, spraying, cultivation, and pruning. The Napoleon Bigarreau Cherries were on first inspection mostly all true to name, but now the similarity is just in color; perhaps one-third are true to name, the others differing a little in color, shape and time of ripening. The Elkhorns proved to be fairly true to name, with a few exceptions, one of which probably came from the nurseryman allowing the root stock to grow up, as it bore natural fruit. The Windsors were true, with perhaps four or five exceptions. The Black Tartarian trees have the characteristic growth of that variety. The large fruited Montmorency are not true to name, but are Montmorency ordinary, Early Richmond, and other unknown varieties of the same type. The Early Richmond were mostly true to name.

My next experience was filling in my original peach-orchard, so I went direct to a self-styled "reliable" nurseryman, and in the place of Elberta and a few other choice yellow-fleshed varieties I had ordered, I got a number of trees which bear small sour white-fleshed peaches, and which ripen about the time of the first frosts.

My later plantings of pears, peaches, and plums were procured elsewhere, and I really think the nurseryman attempted to fill the order as ordered, as they are largely true to name.

My experience has been, I am sorry to say, similar to the experience of far too many; all suffer more or less. Only this year these small white-fleshed peaches have cropped out in a neighboring orchard under the assumed name of "Yellow St. John," and on Nov. 1st they were none too ripe, but suffering from the effects of a frost These were also procured from the same "reliable" nurseryman. Another intends to make sure he is to have his stock true to name, so supplied the nurseryman with the buds to bud the stock, and then found after the trees came into bearing that they were some poor worthless variety.

One not interested in the growing of fruit, especially tender fruit, such as peaches and cherries on a commercial scale, cannot appreciate the loss caused by the neglect to fill orders true to name, but wilfully substituting some other variety. Should I have a block of cherries I want a succession of varieties to keep my pickers steadily employed. I also want varieties least subject to rot, and trees which will bear profitable crops, and of good commercial varieties. The same is true with peaches. If I have a good connection with the retail trade, I want a succession of good varieties to start

with the earliest good peach, possibly the yellow St. John, and following up with other good standard varieties, and end with the Smock, not be rushed with several hundred trees ripe at once, then nothing to pick for a week or two; then another rush; and just because the nurseryman substituted.

Ontario fruit has borne a fairly good reputation, but it was thought to be in the best interests of fruit-growing for the Dominion Government to pass the "Fruit Marks Act." It was ridiculed by many, and sneered at as being unworkable and impracticable, but later revisions have made the law no less stringent, and now the wisdom of the enactment of such a law is becoming quite evident, as it has given confidence to buyers, and the dishonest packer gets his just reward. And yet what do we hear even as late as June 23rd and 24th at the Western New York Horticultural Society, of which some of us are members? The committee on Legislation reporting on a resolution in favor of a Federal law to define and fix the various grades of apples and to provide for their inspection when in closed packages reports:

"Such a law is unnecessary and not needed on account of public health and morals. Honest packers do not need an inspector. If a fixed grade were established packers could not pack up to it, on account of the lack of trained help; and the want of the necessary knowledge of growers and packers in general. It would give too much power to inspectors. To get the most out of fruit the grower should be allowed to grade them according to variety or season more or less. The proposed legislation suggests strongly the Canadian Fruit Marks Act, under which the growers and packers across the line do business, but which appears quite foreign to the free spirit of this country;" or as another speaker calls it "the freedom we enjoy under the American flag."

This Ontario Fruit Growers' Association meets annually with the object of furthering the interest of fruit growing in general. How better can we further our interests than by having a law enacted similar to the Fruit Marks Act, whereby it will be possible to get No. 1, No. 2 and No. 3 nursery stock, and have them true to name as the Fruit Marks Act calls for? While I believe some nurserymen are trying to do what is right, others will find it hard work even when compelled by law to do so.

The proposed enactment of such a law will be held up to ridicule as the Fruit Marks Act was. Ridicule! The mean contemptible way that corporations sometimes take to turn the mind of the public against proposed laws for the safeguarding of the interest of the public against the questionable methods of operation of such companies. Shall we insist on having such a law? If we do, we will get it. What has been the experience of each member of this Association?

The following are a few abbreviations of the laws governing the transportation of nursery stock in some of the States and parts of Canada:—

Alabama. Nursery stock has to be inspected. Scale insects and some other diseases are quarantined against.

Arkansas. Packages must bear certificate of inspection.

California. All nursery stock shipped into the State must have consignor and consignee's name; also name of the place where grown. All stock is subject to inspection and disinfection. Stock infested with pests not already in the State will be destroyed. No apricot, peach, or nectarine trees, cuttings, buds, or grafts will be admitted from any place where "yellows" or "peach Rosette" is known to exist.

Colorado. Incoming shipments are subject to inspection by county inspectors under the supervision of the State Board of Horticulture.

Connecticut. Stock must bear a certificate of inspection and fumigation.

Delaware. No stock allowed to be sold unless first inspected and fumigated with hydro-cyanic gas.

Georgia. Trees must have a certificate of inspection and fumigation.

Idaho. All nurserymen doing business in this State are required to furnish a surety bond for $1,000 conditioned on the faithful compliance with the law requirements as follows: (1) Representatives must have a certificate showing that their firm or firms have given bonds; (2) That stock being shipped into the State has been examined by a duly authorized officer and a certificate of inspection attached to each package; (3) All *trees, shrubs, plants, etc., must be true to name*; (4) any pit fruit coming from sections where peach yellows are known to exist is strictly prohibited.

Michigan. All nurserymen shipping into the State must fumigate and have also a tag or certificate of inspection and one of fumigation attached to each package. A license fee of $5 a year and a bond of $1,000 must be filed. The conditions under the bond are that only inspected and fumigated stock will be sold, and a list of customers will be furnished if requested.

New York. A certificate of fumigation must accompany each consignment of nursery stock shipped into the State, and all shipments are also inspected by New York inspectors.

Oregon. Inspects all stock regardless of all inspection certificates.

Washington. All nurserymen must secure a license before engaging in the business of selling and importing fruit trees. A license fee costs $5, and for each agent is furnished a copy of the license for $2.50 each, and is good for two years. The nurseryman also deposits a satisfactory bond for $1,000.

British Columbia. All stock must be inspected on arrival at the inspection stations. Nurserymen are required to put up a bond of $2,000 and take out licenses before being allowed to sell nursery stock. The bond is given on condition that the company will pay all damages that may be occasioned to any person in the Province through the sale to such person by the licensee, his agents or agent, of any infected fruit trees, plants or nursery stock, or any fruit trees, plants and nursery stock that are not of the variety and character as represented by the licensee, his agent or agents, at the time of sale.

Suggestions for the Enactment of a Law.

(1) No nurseryman shall be allowed by law to send or sell any known variety under a new name, or any other methods employed for deceiving the public.

(2) No firm shall be allowed to do business under more than one name.

(3) All stock shall be free from noxious insects and fungous and other diseases.

(4) That the law should be made more stringent with reference to the proper fumigation of nursery stock. The Government regulations as to the fumigation of nursery stock are stringent enough. Some fumigate in the house where the stock is wintered, and while the stock is banked up more or less to keep the roots moist.

(5) Stock shall be guaranteed true to name when sold as such. This stock should be tagged with the name of the variety, and also the locality of production be attached to such stock.

Mr. Morris: Do you know of any United States laws that bear directly on the points in question? Idaho is the most backward of the forty-five States, and is the only one that seems to have taken your view of the matter. It is a remarkable thing that the most advanced fruit growing States have not introduced such a law as you suggest.

Mr. Robertson: We do not intend to copy our Association after any in the United States. In the case of New York they tried to introduce a Fruit Marks Act. They left it to a Committee of the Legislature, which sneered at it as something that was done by those who grow and pack apples across the line.

Mr. Morris: I should like to learn if there are any other States except Idaho that have adopted such legislation as you suggest.

Mr. Robertson: I have not had access to the full laws of the different States. Idaho and British Columbia are the only countries that I am aware of. What would suit in the United States would not necessarily suit us.

Mr. Morris: Will you explain your reasons for that statement?

Mr. Robertson: My reasons are that we have been done up by certain nurseries, and we have very little redress. I should like to see a law passed giving redress. I have nothing to say to any nurserymen who tries to do what is right and gives us true, honest stock. But from what experience I have had, I judge that the prime object of many of them is to get rid of the stock they have in the nursery regardless of what their orders call for. I would ask that a committee be appointed to take up the matter.

Mr. Stevenson: The northern parts of this Province are overrun with fraudulent apple trees. I know there are honest nurserymen, but there are also dishonest ones. There should be some way of insuring that people get what they need and what they pay for. I do not think it matters what laws they have in the United States; we need to protect ourselves.

Mr. W. L. Smith: With reference to the statement in connection with which my name is mentioned, I had the facts before me at the time I made the statement. The party I referred to was a schoolmate. He has occupied the farm on which he lives for the past twenty-five years. He ordered the trees himself, and they were planted under his direction. If I said that one-fifth did not come out according to what was ordered, I spoke the truth. These trees were of an absolutely worthless variety, and the nurseryman acknowledged the fact in a letter over his own signature—that the trees were not true to name, and that something like one thousand of the same variety had been scattered broadcast over the Province. He offered, if I remember correctly, to replace the trees. But the man had planted these trees when he was past fifty years of age, and it took ten years to determine what he had got. He did not propose to replant for his old age after he was sixty.

Anyone who has been over in the United States knows that in matters of agricultural legislation this country leads, as we do in agricultural production.

Mr. E. D. Smith: I can assure you that there are two sides to this question, and at the proper occasion I should like to have an opportunity to present the other side.

Mr. W. H. Bunting: A comparison has been made between the Fruit Marks Act and some law in reference to nursery control. The comparison is hardly opportune. When criticism arose some years ago regarding the methods pursued in packing apples, the fruit growers rose to the occasion and asked Parliament to provide the necessary regulation. I feel sure that any nurseryman who intends to do what is right by his customers will hail with joy some reasonable and moderate restrictions that would safeguard

the matters that have been complained of. I am sure that these gentlemen would not object to anything that is reasonable to assist in helping to allay the feeling that has arisen and in safeguarding the business.

Mr. G. C. CASTON: Agents do a good deal of harm, especially in the north, by recommending varieties altogether unsuited to the district. In many cases local agents do not know much about varieties or what is suitable. Great loss is occasioned in this way. I think it would be a good idea if the nursery agents would visit the nearest fruit experiment station and secure a list of the varieties they could recommend as being suitable to plant in that locality. Nurserymen should instruct their agents to do this. With regard to top-grafting, if you get good sound trees that are suitable for top-grafting on, you will not be very much out even if the stock supplied is not true to name.

At the suggestion of the Chairman, Mr. Robertson moved that a Committee to consider the question consist of Messrs R. Thompson, W. H. Bunting, P. W. Hodgetts and the mover.

Mr. Stevenson seconded the resolution.

Mr. W. E. WELLINGTON: Before putting the motion, let me make a suggestion. A committee of fruit growers is all right; I do not think that nurserymen will object; but I do think that the fruit grower, as a rule, is a more intelligent man than the average man, and that in your own interest, if you would name a committee to meet a committee of the nurserymen, you could probably get together and bring about what you want without any friction whatever. Speaking as a nurseryman, I have no objection to anything that is fair. I would be prepared to put up a guarantee if it were necessary. While I think that the planter has ample protection as a rule, there are points that would be of mutual benefit if they could be brought out. It is of no use throwing this matter altogether on the nurserymen, nor on the tree agents, because, after thirty years' experience, I know that the fault is in nine cases out of ten with the purchaser. Time and again have I written to agents instructing them not to sell a certain variety. The answer comes back, "The man says if he does not get that variety, he will throw up the whole order." There are just as many rascally customers in proportion as there are rascally tree agents.

When you come to talk of experiment stations, we are in a position to give as much information to an agent as would the experiment station; but in addition to that, we do send them to the experimental stations. Only yesterday I told the agent at Ottawa to go to the Experimental Farm and get information as to the better varieties that have been tested there. There is no object in selling varieties discriminately, and we try, and I believe other nurserymen do—those nurserymen who grow their own stock and want to keep up their reputation—to fill correctly our customers' orders. Men may be perfectly honest and yet send out something untrue to name, because a careless employee has got hold of the wrong bud-stick. Nurserymen, I know, are willing to rectify such mistakes if they are approached in a decent way. I think that if you will name your committee, and meet a committee of the nurserymen, it will bring about what you wish with no friction whatever. We shall be glad to name a committee to work with you.

The CHAIRMAN: I hope you will see your way clear to meet the nurserymen in a fair open-handed way and see if something definite cannot be put before the Association at another session.

The motion to appoint the committee nominated by Mr. Robertson was then put to the meeting and declared carried.

Mr. Pettit: A committee representing the fruit growers having been appointed I think it only fair that we should appoint a committee of nurserymen to meet with them. I move that the following constitute the committee, Messrs. E. D. Smith, W. E. Wellington, and E. C. Morris.

Mr. Peart: I have pleasure in seconding the resolution, as I think it is a very proper one. I think that the majority of the nurserymen try to do an honest business, and that it would be perfectly fair to appoint a committee of nurseymen to confer with the other committee upon this question. I have had very little to complain of in my experience of the stock sent out by nurserymen.

The Chairman thereupon put the resolution to the meeting, and declared it carried.

ERRORS IN SPRAYING.

Prof. H. A. Surface, Harrisburg, Pa.

I have not prepared a paper for this occasion, and shall have to speak extemporaneously upon the subject:

A number of erroneous impressions are common in regard to spraying. There is a general impression that spraying is a preventive of all loss in fruit growing. Nothing can be more fallacious; it is not. I will try to bring out more clearly what I mean. First, there is a general feeling that it is necessary to spray to prevent the appearance of insects. I know of only one insect for which we spray to prevent its coming; that is the codling moth. We do not spray to prevent the coming of insects, although we do spray when they are present to destroy them and prevent loss by their attacks. If I had an orchard free from insects, I should not spray with anything, so far as insects are concerned, excepting that I would spray at the proper time and with the proper material for the codling moth.

There is a very general impression that Bordeaux mixture is an insecticide; it is not. At the same time, it may act as a repellant and drive away certain insects. It is simply a fungicide composed of copper sulphate and lime and if we wish to make an insecticide of it, you must add an arsenical poison.

There is also an impression that Bordeaux mixture will cure plant diseases. There is a difference between curing and preventing. Prevention is better than remedy. It will not cure fungous diseases, but will help to prevent their appearance. There is a great difference between spraying with insecticides and with fungicides. The difference is this: With insecticides, in all cases save that of the codling moth, we spray as a remedy; with fungicides, we spray to prevent the appearance of disease, such as scab, leaf spot, rot, mildew, peach leaf curl, etc. After such a disease as leaf spot or fungus has started in a leaf it cannot be cured in that leaf.

Again, there is an impression in our State that benefits can come from spraying trees in bloom. We do not spray blossoms and no benefit of any kind is to be had from doing so. It is bad horticultural practice. If there be a surplus of blossoms and you wish to reduce them, it will help to thin the crop, but it is a poor way of thinning, and not to be recommended. I have seen abortive fruit produced in this way and, besides, there is the danger of killing bees, which do so much to fertilize and cross-fertilize the blossoms.

There used to be an idea that spraying would poison fruit or vegetables. This especially was thought to be the case in spraying cabbage for the

cabbage worm. Our best gardeners spray cabbage with Paris Green, and analyses show that a person would have to eat about two hundred cabbage heads to get enough Paris Green to affect him. Spraying does not poison fruit and there is no danger of its doing so.

Another mistake is the thought that animals are liable to be poisoned by eating grass under trees sprayed with Paris Green or arsenate of lead. There is almost no danger in this respect. Of course there should be no grass in the orchard, unless the "sod-mulch" system is being practiced—a method that is well worth trying.

There is an idea that spraying kills bees. With lime-sulphur wash that is absolutely wrong as the wash is applied before the buds burst. With other insecticides there is no danger so long as they are not applied while the blossoms are open.

A writer for Prof. Bailey recently wrote an otherwise excellent article for his Cyclopedia of Agriculture on birds in relation to agriculture, in which he made the remarkable statement that birds are liable to be killed by modern methods of spraying. I consider this entirely false. Spraying does not kill birds, and I wrote the editor saying that if the statement were published, I should protest against it, and that others would protest it too. I am glad to learn that it was stricken out.

Many people think that if a little is good, more is better. That is a very poor belief. There is more danger from too much than there is from too little. Too much may endanger or kill the plant. Too diluted a formula may result in not accomplishing the work for which you are spraying—in not preventing the disease or killing the insect—but you will have no other loss than that of time and material and possibly continued pests; whereas, if you use too much, you are liable to injure the fruit or even kill the trees. There are certain materials of which it makes little difference if you use too much, such as the lime-sulphur mixture and the Bordeaux mixture applied when not in leaf.

The question was raised last night as to whether aphids could be killed by the lime-sulphur wash. I know it can be done as I have seen the boiled lime-sulphur wash clean up both the apple aphis and the cherry aphis, applied just before and when the buds were bursting.

It is the general opinion of operators that materials can be mixed by guess. They should be weighed and measured most carefully, to the very ounce. When I tell a man to spray 8 per cent. kerosene, I do not mean 10 per cent, and if he should use 4 per cent. or 5 per cent. above what I say he is to use, it is liable to result in injury to his trees, under certain conditions. A man should know the exact percentage to use, as well as the correct time to apply it.

There is a general impression that spraying can be done when the wind is blowing and get satisfactory results. It is almost impossible to spray against a wind. You should spray with the wind and cover that side of the tree; then you must wait till the wind has ceased or changed direction before spraying the other side. That is the only proper way to spray if windy. You cannot throw a spray against the wind, although you might use a squirt-gun or a fire hose and throw a stream or jet, but that is not spraying. The spraying material, in a fine state of division, should drift over the tree in the form of a mist, and not be thrown as a stream, and sometimes not under too great pressure. I have known of cases where so much pressure was used with Bordeaux mixture that the material was actually driven into the pores of the leaves, which were severely injured in consequence. There

is a possibility of injury by using too much power when the leaves are in a delicate or tender condition.

Q.—Would 35 pounds pressure be about right?

A.—Yes, and then you will not have this difficulty. Many people using power outfits spray at from 60 to 80 or more pounds pressure, and rarely get below 40 pounds. High pressure will not cause any injury when trees are dormant.

Many suppose that the height to which the spray is thrown depends upon the power of the apparatus. That is not so. What is required more than anything else for very high trees is sufficient length of hose and an extension rod, with ladders for operators to climb.

Efficient spraying cannot be done with poor, cheap hand apparatus. For the average orchard I would not recommend anything cheaper than a good barrel sprayer.

Many men seem to think that one spraying should be enough. Some write me: "I sprayed my trees once, and the scale is there still; I am disgusted with the formula you recommend." It takes more than one dose of medicine to cure a disease, and more than one spraying to overcome scale.

If we can control the San José scale, and produce first fruits without much expense that ought to be sufficient to satisfy us for the present; we can never get rid of it entirely. Do not think you can spray two or three infested trees in an orchard and leave the rest. Under such conditions all the trees should be sprayed, being sure of the second or re-touching spraying.

Some think they can modify the formula recommended and get better results. It is not safe to attempt it.

The following facts are not generally known:—

That sprayed fruit keeps longer than unsprayed, without damage.

That sprayed fruit stays on the trees much longer than when unsprayed.

That some diseases are not to be prevented by spraying, namely, apple and pear blight and peach yellows.

The operation should be for a definite object; we should know for what we are spraying, and then spray thoroughly at the right time with the right material, in the right proportions, with the proper apparatus. This is a very important thing. Spraying is not in itself sufficient to produce good fruit; we must have cultivation, pruning, and thinning of fruit, and finally we must spray as the most satisfactory means of controlling insect pests and preventing plant diseases.

Q.—Do we understand you to say that spraying will not prevent leaf curl?

A.—It will prevent it, but not cure it after it has started; after the leaf has started to curl, it will not cure it. There is a difference between prevention and cure.

Q.—How soon after the leaves are off is it safe to spray?

A.—At least ten days should elapse after the leaves are off. The base of the petiole of the leaf leaves a deep surface scar, and until this heals over it is not advisable to spray. (This refers to fall spraying for scale insects). In spraying for codling moth, in spring, the important point is to spray just after the petals fall, and then again in ten days' time. Some of our growers are getting 98 per cent. perfect fruit. You may use Paris Green and Bordeaux mixture together, although I believe arsenate of lead is more effective and nearly as cheap as Paris green; but a good unadulterated Paris green is excellent.

Q.—What do you use for oyster shell bark louse?

A.—I have seen bad infestations entirely cleaned out by one double spraying of lime-sulphur wash in the fall of the year. This mixture will kill all the scales, and also the cigar case-bearer, eggs of the tent caterpillar, aphids, and many other insects.

Q.—What do you mean by double spraying?

A.—Two coats; after the first coat is dry, give the trees a retouching spray. This is especially necessary in spraying for San José scale. We have growers who are spraying every year because the lime-sulphur wash has such a tonic effect on the trees, although it may not be absolutely necessary in order to keep the scale in check.

Q.—Do you recommend scraping?

A.—I do not think it is necessary so far as scale is concerned.

Q.—Does it injure the tree?

A.—It can, if too deep. You should not scrape so deeply as to injure the bark.

Q.—Is salt of any value in the lime-sulphur mixture?

A.—It is not necessary, and we do not recommend it. When salt is added to this mixture there is sometimes injury to peach twigs and buds by spraying just after the leaves fall.

We are in the midst of experiments with sulphur-soda wash as a treatment for San José scale. Our first experiments killed the fruit buds, and we have not experimented far enough for me to say just what strength should be used with safety. My opinion is that it should be about as follows: 4 lbs. caustic soda or concentrated lye, or even washing soda, boiled with three times as much sulphur for an hour, and diluted with 40 or 50 gallons of water.

REPORT OF COMMITTEE ON RESOLUTIONS.

Mr. W. H. Bunting, Chairman, presented the following report from the Committee on Resolutions:

That this Association desires to express its appreciation of the value of the work carried out in the past through the experimental fruit stations, and hopes that this work may be extended and enlarged; that we would respectfully suggest as the line along which extension take place, that the new Jordan farm be made the source of supply from which new fruits, tested or developed there, shall be sent out to the local stations for the purpose of testing their adaptability to the various localities; and, finally, that the Director of the Jordan Station be made general supervisor of the local stations, subject to the direction of the Board of Control as to the work both at Jordan and at the local stations.

That this Association desires to express its cordial approval of the Fruit Marks Act, and of the manner in which the same has been administered under the direction of Alexander McNeill, Chief of the Fruit Division of the Dominion Department of Agriculture. We believe the high standing secured by the Canadian apple in the markets of Great Britain is largely due to the Fruit Marks Act and the work done under it.

That the Association tenders its thanks to Professor H. A. Surface, Mr. Willard Hopkins, of Youngstown, N.Y., and to the other gentlemen who have assisted in the programme.

That the Association recognizes the value of the work performed by the Canadian Industrial Association in the erection of a suitable building on the exhibition grounds for the proper accommodation of the fruit exhibits.

That the Association endorses the action of the Provincial Government in providing for a display of Ontario fruit at the exhibition of the Royal Horticultural Society in London, England.

That the Association recognizes the liberality of the Provincial Government, and the council of the city of Toronto, in providing funds for the carrying on of the Ontario Horticultural Exhibition, and the assistance of the citizens in helping to make it a success.

That the Association tenders its thanks to the retiring President, Mr. Harold Jones, for his intelligent and energetic administration of its affairs, and regrets that, owing to a change in the constitution, it is unable to avail itself of his services for another year. The results of the year's work will remain as a memorial to his industry, discretion, and public spirit.

With reference to the resolution respecting the retiring President, Mr. W. H. Bunting personally said he was sure the Association regretted their inability, owing to the change in the constitution, to avail themselves of his services for a second term. He hoped the time was not far distant when they would again see him occupying the President's chair.

Mr. Harold Jones: I feel rather embarrassed that I should have been named for what little I have been able to do during the past year. I feel very grateful to you all for your kindness in giving me this expression of your regard.

The Committee's report was then submitted to the meeting and declared carried.

It was further moved and carried: That the thanks of this Association be tendered Mr. L. Woolverton for the excellent work he has produced in the "Fruits of Ontario," and that with his name be coupled the names of Mr. W. T. Macoun, and our Secretary, Mr. P. W. Hodgetts.

EXPRESS RATES IN RELATION TO THE FRUIT INDUSTRY.

By J. L. Hilborn, Leamington.

In attempting to discuss this matter of express rates and service, I do not know that I have anything to offer that is not already well known to most of you. It is a well understood fact by all the fruit and vegetable growers who have had experience in that line, that the subject of express rates and services continually stands as a mountain between them and satisfactory returns for their products in nearly all cases where it is compulsory for them to use express services in order to deliver their crops in the hands of the consumers.

We, and no doubt many of you, have for years been attempting to secure more reasonable rates and better service, but in most cases have made but little headway. In reporting on this matter, from the standpoint of the Leamington grower, I might state that we have three express companies represented in Leamington, who, of course, all have the same rate, and no very great difference in the service rendered. As far as I am able to judge, the difficulty rests more largely with the respective railroads, over which the express companies operate, than with the express companies themselves. It is at least pretty equally divided. The different railroads, under whatever name they operate, all seem to work with the same end in view, which is to get all possible out of the business for themselves. To my mind, the express companies, probably on account of considerable rivalry between the

respective companies to secure the bulk of the business, pay their respective agents a much larger percentage than is consistent with the price obtained by the grower for the labor of producing the crop. As far as I am able to learn, the person acting as agent at the shipping point receives ten per cent. of all charges, while the receiving agent at the distributing end receives the same commission. I have been watching this matter for a number of years, in connection with the shipping of my own products, and have always considered that the representatives of the express companies were receiving a much larger percentage for their labor than the service warranted. This has a tendency to stimulate the agents to hold the prices up, as well as to endeavor to secure all the business possible for their companies, and to bill goods always at the highest maximum rate. There are a number of us shipping from Leamington, who send daily through the summer season from an average of perhaps three thousand pounds up, each day. Counting this at a minimum average, it would net the billing agent fully two dollars per day, as a commission for billing this amount of stuff from each shipper, which would probably require about ten minutes' time. When we consider that the distributing agent at the other end receives another rake-off of ten per cent., making about four dollars per day for each individual small shipper, as we are here, for about ten minutes' labor at either end, we consider it an injustice, and as there are a large number of such shippers here, this aggregates a large amount. It is in this manner that the respective agents receive a large portion of their yearly salary, as at all points where there is a considerable quantity of goods to be shipped by express, the railroad companies pay their agents but a very small salary, with the understanding that they receive their pay through these express commissions.

As the leading stockholders of the various express companies are the same stockholders who own and control the railroads over which the respective express companies operate, it is to be expected that they would operate hand in hand. This is the great difficulty in getting a solution of, and a remedy for, the serious grievances which are continually facing the man who is compelled to use these companies, in order to place his goods on the market. The various express companies operating from Leamington have an agreed tariff, and all receive and deliver at the one price, whether carried entirely by one company, or as often happens, two companies may be used, in order to reach the destination. This season, we have been very seriously handicapped by the action of the Candian Express Co., who are not represented at Leamington, and who demand a full tariff from the transfer point, which in this case is London, to the point of distribution, at all points where they have exclusive power, at such points. They will carry goods to competitive points and meet the ordinary tariff used by the different companies, but will not do so where they have full control. This has been the means of practically all the shippers from Leamington losing their trade to exclusive Canadian points, as our customers at such points were compelled to pay a full tariff from Leamington to London, over one route, and from London to distributing point over the Canadian Express. This we consider very unfair. The matter was taken up by the Leamington growers early in the season, when we made every possible effort to secure a remedy, but were unable to command any better terms.

The growers in the Leamington district are fairly well satisfied with the services rendered by the Dominion Express Co., while it is fully acknowledged that the charges are more than they should be for such service. They have usually shown a disposition to settle claims and adjust wrongs, which is more than the most of us will admit in connection with some other com-

panies. The extravagant prices demanded for carrying the goods is, as a rule, no guarantee of careful handling or safe delivery of same. A number of Leamington growers this season formed a co-operative association, and packed and shipped all goods from a central packing house, for which I happened to be manager and salesman. As we distributed goods to so many different points throughout Canada, we received a very great number of complaints from our customers regarding the exorbitant charges, and also the damage sustained by goods, caused by rough handling, and we are convinced beyond all shadow of doubt that the services rendered bear no comparison to the tariff charged therefor.

Our express rates to nearly all points are about double the freight rate, and in many cases it is much more than this. Our express rate to Winnipeg is $2.90 per hundred, while we can ship by freight, in car lots, at sixty-six cents.

I am at a loss to suggest definitely any means of compelling the express companies to give better service and more reasonable charges; I say "compel," as it would appear that is the only word. If we could induce the railroad commission to investigate thoroughly this question, I am convinced they would agree with the fruit shipper that existing conditions are unfair to him, and compel them to give us some remuneration for the severe losses to ourselves, caused by their reckless handling of our goods, after receiving extravagant prices for handling same; and would also, if possible, compel the express companies to give us better service and a more reasonable tariff.

E. D. Smith, Winona: The relationship between the express companies and the fruit industry is of course very intimate, and the safety and cheapness with which these companies carry our fruit makes at times the whole difference between profit and loss. I might talk to you by the hour of the grievances and troubles we have had and still have. I might show how, in some cases, trade might be doubled if rates were lowered, but it strikes me that any amount of discussion we may have here will accomplish nothing. What we want is a strong committee appointed by this Association to take the matter up before the Railway Commission. The Commission will, I believe, take the question into consideration soon. They have power to deal with this matter. If we want our grievances remedied, there is only one way to do it, and that is to go before the Commission with a strong case, and be thoroughly prepared to establish it. This is not easy, and it cannot succeed unless the Commission is made strong enough and big enough to investigate the express and freight business from the bottom up, and ascertain whether the companies concerned are making undue profit or not. I have often complained to express companies that the rates were too high. They would say when I had concluded: "We wish we could give you a lower rate, you are a large customer, but we cannot do it; we are only making six per cent. on the capital invested in our company, and we are struggling day and night to do that; what more can you ask?" But how do we know that they are only making six per cent.? The only way to do is for the Railway Commission to go into the books of the railway and express companies, and ascertain whether or not they are making excessive profits. If they are not, no one can ask them to lower their rates. But we must, if we expect to get any reduction and better accommodation, state our case before the Board and state it strongly. We have a transportation committee to deal with these matters, and I would suggest that they take this matter up with the Commission.

J. L. Hamilton, Clarkson: This question of express service and rates in my opinion overshadows every other question that has been brought before

this convention. There are a great many things to be done and details to be threshed out which cannot be gone into here, and I trust that a very strong committee will be appointed to deal with the matter.

We, at Lorne Park and Clarkson, are the last shipping points for small fruits to Toronto on the Toronto-Hamilton line. We in that district are largely interested in strawberries and other small fruits, and ship at a time of the year when it is of vital importance to the business that our product should be placed upon the market as quickly and handled as carefully as possible. There is an old saying that the last shall come first, but in this case it is very far from the fact. We have three trains daily that carry our fruit to market. Both at Lorne Park and at Clarkson the express agents are girls, and can give no assistance in handling consignments. There is one man in the car whose duty it is to take charge of the produce, receiving it and storing it away. That man renders little or no assistance. Therefore the shipper has not only to wait often for a considerable time at the station in order to put his product on the train, but has to have two or three men in the car to see that it is stored away. Even then the train frequently pulls out leaving part of the fruit on the platform to spoil. Delegations have been sent to the Canadian Express Company to ask them to remedy this condition. They have come home thinking that possibly things were going to be done. Last year, first of all, the express rates, which were considered fairly high in that district, were increased twenty per cent. The Company said then that they intended to give us more adequate service. What was the result? Men who have been shipping for the last twenty years state that the service was never so indifferent as during the present season. The fact that the fruit is often left on the platform is, I believe, largely due to the companies' employees, and I believe it is in the interest of the companies as well as of the fruit growers that this business should be cultivated. If there is any way by which details can be regulated so that we can get better service, I think it is an important point to bring before the Commission.

I do not know that it is necessary to go into all the details. What we want is, first, that the rate be restored to what it was previous to last year; second, that the cars should be large enough to receive the shipments, and not have our fruit left on the station platform, and third, that the employees of the company should be so instructed that they will not consider they are conferring an honor on the fruit growers by taking their stuff, but rather the other way.

Mr. Alex. McNeill, seconded by Mr. Bunting, moved that the following constitute the Transportation Committee for the ensuing year: Messrs. W. H. Bunting, St. Catharines; J. L. Hamilton, Clarkson; R. W. Grierson, Oshawa; E. D. Smith, Winona; R. J. Graham, Belleville; Wm. Randall, Grimsby; J. L. Hilborn, Leamington, and the Secretary of the Association. The motion was put to the meeting and declared carried.

THE NECESSITY FOR AN IMPROVED FRUIT MARKET AND TERMINAL FACILITIES AT TORONTO.

By H. Dawson, Toronto.

A number of charges can be made against the fruit market at Toronto as not being a place suited to the handling of fruit. In the first place, the appearance of the market is very much against it. I have often felt

ashamed when I have been compelled to take large shippers from the United States and Canada to see our market, because I could not show them respectable market premises.

The second complaint against it is that the accommodation is insufficient for handling the business. There should be sufficient room to display every shipment properly. I have seen times when I have had to pile fruit from twelve to fourteen baskets high. This means a serious loss to the shipper, not only because of the damage done to the fruit and baskets, but also because of our inability to display it properly to buyers.

In the next place, the market conditions are unwholesome. After every rainstorm there are pools of water lying underneath the market. If any board of health were to inspect it, they would, I am sure, condemn it.

You have stated a number of grievances that the fruit men have against the express companies. Another one can be added in this connection; the express companies do not deliver the fruit properly into the market, the main reason being that they will not hire sufficient competent help to enable them to do so, and from the manner of checking it off, it is a wonder there are not more shortages than at present. We do not know how many packages are coming from the consignor, and as we have no way of checking them, we do not know whether there are shortages or not until after we have made a report to the shipper. In some cases the shipper puts in a slip or drops us a card to let us know, but as a rule this is not done. The express company has a bill of the goods, and they should be compelled to give us a memo. of them. When the goods arrive at Toronto, the express companies often do not deliver them until late in the day, owing to insufficient help, which does not give us a chance to handle it to advantage.

The question arises then, how can the fruit market be improved? Several plans have been suggested. I think, however, that the city should have full control of the market and should provide an adequate building. I think that everybody who has occasion to occupy the building would be willing to pay a reasonable rental, which would afford a revenue to the city.

The city possesses a property at St. Lawrence Market which they could convert, with no very great expenditure, into a fruit market. By that expenditure they would be increasing the value of the property around them, of which they own a considerable quantity, and could add to the revenue by necessary ground rentals, taxes, etc. Even if they did not get any direct revenue from the fruit market itself, they would be compensated indirectly for any expenditure. With ample market accommodation considerable fruit that is now sent elsewhere would come to Toronto. This would have a tendency to bring together buyers and make it more of a produce market than it is to-day. The men from the small outlying towns would prefer to come to Toronto to buy their fruit, rather than have it shipped to them direct by the growers on commission, for the reason that they do not know on what day they are going to receive stuff; consequently they are out of fruit half the time. This would not occur if they were compelled to come to Toronto to buy.

In case the city does not do so, a private corporation might undertake to erect a building. Such a corporation should not have any interest in the carrying companies. That is one of the drawbacks of the present market: It is controlled by one carrying company alone, although presumably by two—the Grand Trunk and the Canadian Express—the Dominion Express paying toll to the Grand Trunk on every package. On the goods we bring off the boats, we have to pay toll out of our commission.

Some people have suggested that a market should be erected south of the tracks; I do not think that is necessary. Even if we had to go farther away from the centre of the city than we are, it would not make much difference; the trade could come. The quantity of fruit that came by boat last season was less than ten per cent. of the whole, and 75 per cent. of that 10 per cent. was hauled by the commission men themselves from the boat to the market. The boat trade therefore cuts a comparatively small figure.

There will be a time when the radial lines will have access to our city, and when they do, I think I am safe in making the assertion that the greater portion of the goods will be brought in by them. This will be more convenient to the fruit grower who will have the cars running near his own door, and do away with many of the complaints against the express companies.

CONTROLLER HUBBARD, Toronto: During Exhibition time when I discussed this matter with Mr. Bunting, I told him that if the Association would send a Committee to wait upon the Council, we should be very glad to consider whether something could not be done to remedy the evils complained of. I think the complaints are well founded. We, as a corporation, are not responsible for the present condition of affairs. In the past, the Council appointed a special committee to look into this matter and see what could be done. I regret to say that we did not receive very cordial sympathy or support from those engaged in the business, and it might be only reasonable to expect the initiative in this matter to be taken by them.

The fruit business is one of great magnitude, and of the greatest importance to the city. Fruit comes here because, with the population surrounding Toronto, we have over three hundred thousand people to eat fruit. Toronto is also, from its situation, the best distributing point.

I do not know what influence the companies have in the matter. Perhaps they prefer the present market because they can run in their cars at a minimum of expense, but a more unsuitable place in which to show the fruit of this province to the people who go there, I defy you to find. It is dark, dirty, and unsanitary.

Fortunately the city owns a large amount of land on the lake front. At the present time there is a large dock at the foot of Yonge Street that is unoccupied except by tramp steamers, which might be used in connection with Bayside Park, which would form an admirable location for a fruit market. If a suitable fruit market were built there it would be convenient both to railways and boats. The fruits growers are not looking for any particular generosity at the hands of the citizens, but simply for justice when they come here to dispose of their wares. I believe that if a committee of the fruit growers and commission merchants were appointed to take the matter up with the Toronto City Council, some good and satisfactory results would follow. Would back up such a committee with the Council, and I do not believe from my knowledge of the members of the present Council that they would refuse to take the matter up. It concerns not only the fruit grown in this Province, but also the fruit we import during the winter season from other parts. If a fruit market were established here, owned by the city, you would always be safe, and we should be satisfied with the indirect benefit.

CONTROLLER HOCKEN, Toronto: I have not been in the City Council so long as Mr. Hubbard, nor have I had to do with this question as he has had. He speaks with a good deal of authority. So far as I am concerned, anything I can do at any time to provide better facilities for this rapidly growing trade, I shall be glad to do. I appreciate what Mr. Hubbard has

said about the demand of our citizens for fruit—the best fruit and fruit in good condition. It is entirely unsatisfactory to the consumer that the fruit he buys should be handled in the way it is at the present time, and must be so long as the present market continues. You may count on my very sympathetic assistance, so far as I can render any aid as a member of the Council.

Alderman Chisholm, Toronto: In anything that may be done in this matter, there is one important thing to be borne in mind and that is the way by which the radial railways will come into Toronto. I am inclined to think that the St. Lawrence market with some repairs and alterations would meet the case admirably so far as location is concerned.

As regards civic control, I think that is on the right line. We hear a great deal now about municipal control, but I think that the markets at all events should be controlled by the city.

Mr. R. C. Harris, Property Commissioner, Toronto: I came here merely in the capacity of a listener that I might hear what were the views of your Association regarding the matter. These views will assist me in arriving at a conclusion should the matter come before me, as it undoubtedly will do.

I fully agree with those speakers who pointed out that the bulk of the fruit would in the next few years come into the city by means of the radial railways. An enormous trade could be developed in that way. The St. Lawrence market would be the natural terminus for those lines. Although Mr. Dawson states that only ten per cent. now comes by boat, I think that when the radial lines take effect, that percentage will be very much reduced. Some time since the city took active steps to see if they could not improve the conditions of the fruit business. They approached the navigation companies in the matter and were informed that, in the event of the city building a wharf at the foot of Jarvis Street, they could not see their way to stop incoming steamers there to unload fruit. This suggested a slow light line of boats that would land fruit in Toronto early each morning from the various shipping ports on the Lake. The Company absolutely refused to do anything of the kind, however.

We then went to the Grand Trunk, as that company practically has the control of the terminal. They were quite frank about it. They said, "we control the terminal and the trade, and propose to continue to do so. Go ahead with your market if you wish, but we will not run lines into it, and just the moment we have competition we will throw off our charges, and, if needs be, provide better quarters. It seems hardly likely that the commission men and business men would care to pay us a rental sufficient to pay the annual charges on any outlay that might be made in this connection if they were to receive an offer of free accommodation from the railway.

This is the position we are placed in at the present time. I feel sure that if a committee were appointed by this Association, the Board of Control and members of the Council would be very glad to co-operate with them. Along what lines this could be effected I am not prepared to say, as I may later on be called to pronounce upon the matter.

Wm. Armstrong, Niagara: There is no question in my mind that a fruit and vegetable market would be one of the best assets the city ever had. If the railways and steamboat people will not come to terms with the corporation, then, I think something will happen very shortly. What will I do for instance as a grower? I am not going to continue to send my fruit to the terminus we have here, and have it abused as it has been for the past ten

years. There are other markets opening up for my fruit, with the best facilities for handling it, and they shall get it if circumstances do not change. The question is a vital one in our township, because the fruit growers come here frequently to see the manner in which their fruit is handled. There is but little inducement to produce the finest fruit, if, by the time it reaches the consumers' hands, it is in more or less of a damaged condition. This should be remedied and must be.

W. H. Bunting, St. Catharines: As a very frequent shipper to the city, I wish to express my appreciation of the manner in which this subject has been received by the city representatives. I regard it as one of vital importance to the fruit interests and to the citizens. I cannot help but say at this juncture that we as fruit growers thoroughly appreciate the splendid reception we have had from the city for the past four years in connection with the bringing here of an annual convention and the establishment of a Fruit, Flower, Honey and Vegetable Exhibition, which we are endeavoring to hold in Massey Hall. We have been able to do that largely because the City Council have willingly and freely acceded to our requests for assistance. One of the city's representative stated that in his opinion the initiative in this matter of market accommodation ought to come from the dealers. I think he is quite correct in that, but the statement has reached me in an indirect way that the dealers were not altogether in harmony as to the methods by which this matter could be adjusted.

Fruit growers who ship frequently to this market, and who have time and again suffered hardship from the inadequate facilities feel that some effort must be made whereby the matter can be brought to the notice of the City Council, the dealers and the railway companies with a view to a remedy being found for the present state of affairs. I am glad to see that the representatives of the city are so willing to join with us in everything that will increase the reputation of the city, and redound to the fruit interests, and I think we are in a fair way to secure some improvement.

With reference to the Grand Trunk holding the key to the situation, I must take exception to that. I do not think that we as growers and users of transportation companies will submit to the dictates of any carrying company as to where and how we shall place our fruit. We have a tribunal before whom to bring such matters, and it seems to me that it would be an opportune time to bring it to their attention when they come to take the matter of terminals into consideration.

Mr. Dawson: A few years ago the Grand Trunk proposed placing a toll upon everything whether it came over their own road or not. The commission men thought it was an injustice, and one day they all moved out. The company finally compromised by agreeing to take the toll off everything that came by their road.

Mr. Bunting: For the information of the gentlemen from the city council, I may say that, briefly, our needs are as follows: That proper facilities be accorded for the display and marketing of fruit, etc., and that they be located at such a point that, no matter by what road we may desire to ship our fruit, the place assigned for this purpose will be easy of access.

The Chairman enquired whether the city representative would like a committee appointed by the Association to confer with the authorities.

Controller Hubbard: That was my idea in throwing out the suggestion. Then both the growers and dealers should get together and try to agree on a proposition to be submitted to the Council.

A Commission Dealer: The wholesale fruit interests have been more neglected in Toronto than in any city of its size in America. A building

such as has been proposed would be one of the best assets the city could have. I am satisfied to move from the St. Lawrence market to any place where a fruit market may be established. It should be made a permanent market all the year round. The St. Lawrence market has no share of the fruit trade, and we could not get the Niagara boats to bring fruit to the foot of that market. As to the radial roads, the city has locked them out, and we do not know when they are going to let them in; it may be ten years or twenty. I think that the most practical place for such a market is the Bay street siding, or at the dock that Mr. Hubbard suggested. If the market is established there, I will guarantee it to be one of the best revenue producers the city has, and that it will be taken up the year round. There are some who have put a stumbling block in the way of the market. They are men who are on the main street. Those who are off that thoroughfare have to take the leavings.

There is no doubt that such a market would be a lasting benefit to the trade. At the present time we have not got market facilities for the handling of fruit and the growers lose in consequence.

Property Commissioner HARRIS: I wish to correct one statement—that the city has blocked the entrance of the radial railways. The city has given the terms on which they might enter: two dollars per freight car in and out, which they say they cannot afford to pay. The Ontario Railway Act contains the provision that if the city and the railway cannot come to an agreement, then they may go before the Railway Commission, and the Commission may dictate terms, and the city is bound to accept. The machinery does not allow the city to take the initiative. We have repeatedly asked the radial companies to go to the Commission if they are not satisfied with our terms. The difficulty is that the radial companies desire to obtain certain running rights beyond the date of the expiry of the present franchise, which we are not willing to permit. This is the reason they will not come into the city. The city is anxious for them to come in.

It was then moved by Mr. W. H. Bunting, seconded by Mr. H. Dawson, and carried, that the following constitute a committee to deal with the matter, viz., Messrs. H. C. Fisher, Wm. Armstrong, J. L. Hamilton, and the mover.

BUSINESS SYSTEMS FOR CO-OPERATIVE ASSOCIATIONS.

By C. E. BOWERMAN, of the COPELAND-CHATTERSON CO., TORONTO.

I want to bring to your notice a system of bookkeeping suited to the requirements of co-operative associations of fruit growers. I understand that what is required is a uniform system for all the associations, and one that is simple enough to be easily worked out by the officers of those associations. I will endeavor to lay before you briefly the system devised for this purposes by the firm I represent.

First of all the triplicate receiving blanks would, I think, apply. When this form is filled out, the first copy is handed to the farmer, who, as a member of the asociation, has delivered certain produce. The second copy is the accounting record. The third may be dealt with in two ways; it may be handled by the order department or shipper to complete when the goods are shipped with the name of the purchaser to whom they are consigned, etc.

Later on the farmer can come back and get the exact amount he is to receive filled in on the form. Some minor alterations will need to be made in the form to meet the requirements of individual associations. All the western milling concerns use the triplicate receipt blanks, and growers are accustomed to deposit their receipts as collateral with the banks.

We next come to what is called the single shipping order ticket. This is taken to the office after it is filled out so that the accountant may credit the grower with exactly what should be credited to his account, and at the same time invoice from that to the party to whom the association is selling the goods, the exact amount required, and carry it out in the regular way as a regular invoice.

This brings us to the ledger. To take care of the business of a co-operative association, and take care of it properly, a specially ruled ledger is necessary. I have designed a ruling which is submitted herewith. Taking the debit side first. There may be extra charges for crates, barrels, etc. These items will of course be placed on that side of the account, while the credit side shows the returns. After everything has been posted, a member can at any time go to the office of the association and see how his account stands. As a rule, you cannot make much out of the ledger of commercial concerns, there being so many abbreviations and private marks.

It may be that a system with blanks such as I have described, costs a little money, but any intelligent man will agree that simplicity and system mean money saved in the long run. The ledger needs to be legible so that a member can see exactly where he stands.

From the ledger we come to the billing system. The sample form submitted is used by the Grimsby Association. It is what we term a "fold-over bill charge blank," and is made in duplicate. The outside sheet is torn off and goes to the purchaser. The inside sheet is placed in a binder, and from this you post to the ledger the amount the association charges to the party to whom the goods are sold. Instead of keeping three ledgers as some association do, one only is required under this system. The ledger may be divided into three compartments if desired. I think that the debit and credit side of the accounts cover the whole idea.

From the billing system we come to the synoptic cash book. This is a combination of day book, journal and cash book. There is not an entry you can bring up that cannot be posted in it. I do not care what line of business you bring up or what your ideas are so far as indirect posting is concerned, this book will meet all requirements. This book will take care of goods coming in, and of cash received, cash paid out, exchange, etc. Finally the details are posted once a month into the ledger; the back of the ledger being reserved for special accounts.

One more item: The duplicate account sales blanks, to be used only in the event of goods being sold by consignment.

We shall be glad to receive a call from any member of your Association at our offices in this city, and show our books and explain everything.

The Chairman suggested that the Co-operative Committee should look into the system and ascertain whether it would meet the requirements of the co-operative associations.

APPENDIX.

FRUIT PRIZE LIST AT ONTARIO HORTICULTURAL EXHIBITION, 1907.

APPLES.

Class 1. Export or Foreign Market Varieties.

(*a*) Barrels ready for shipment.

Baldwin: 1st, Norfolk F.G.A.; 2nd, Chatham F.G.A.; 3rd, Jas. E. Johnson, Simcoe.
Ben Davis: 1st. Harry Dempsey, Rednersville; 2nd, Belleville F.G.A.; 3rd, Oshawa F.G.A.
Golden Russet: 1st, Chatham F.G.A.; 2nd, Frank Dempsey, Albury; 3rd, Norfolk F.G.A.
Greening: 1st, Norfolk F.G.A. 2nd, P. C. Dempsey, Trenton; 3rd, C. W. Challand, Marburg.
King: 1st, Norfolk F.G.A.; 2nd, Oshawa, F.G.A.; 3rd, P. C. Dempsey.
Spy: 1st, Jas. E. Johnson; 2nd, Norfolk F.G.A.; 3rd, Belleville F.G.A.
Stark: 1st. Frank Dempsey.

(*b*) Standard boxes ready for shipment. (Fruit unwrapped.)

Baldwin: 1st. Chatham F.G.A.; 2nd, R. Thompson, St. Catharines; 3rd, Norfolk F.G.A.
Fameuse: 1st, R. Thompson; 2nd, Harold Jones, Maitland; 3rd, Norfolk F.G.A.
Golden Russet: 1st, Chatham F.G.A.; 2nd, R. Thompson; 3rd, Norfolk F.G.A.
Greening: 1st, Robt. Thompson; 2nd, Oshawa F.G.A.; 3rd, Norfolk F.G.A.
King: 1st, Oshawa F.G.A.; 2nd, R. Thompson; 3rd, Norfolk F.G.A.
McIntosh: 1st, Oshawa F.G.A.; 2nd, Frank Dempsey; 3rd, Harold Jones.
Spy: 1st, R. Thompson; 2nd, Jas. E. Johnson; 3rd, Norfolk F.G.A.

(*c*) Standard boxes ready for shipment. (Fruit wrapped.)

Fameuse: 1st, R. Thompson; 2nd, Oshawa F.G.A.; 3rd, Harold Jones.
Gravenstein: 1st, Oshawa F.G.A.
King: 1st, Biggs F. and P. Co., Burlington; 2nd, Oshawa F.G.A.; 3rd, Chatham F.G.A.
McIntosh: 1st, Oshawa F.G.A.; 2nd, Norfolk F.G.A.
Spy: 1st, Norfolk F.G.A.; 2nd, Biggs Fruit Co.; 3rd, F. G. Stewart, Homer.
Wealthy: 1st, Oshawa F.G.A.

Class 2. Domestic or Home Varieties.

(*a*) Barrels ready for shipment.

Blenheim: 1st, Oshawa F.G.A.
Gravenstein: 1st, Oshawa F.G.A.
Ontario: 1st, Frank Dempsey; 2nd, P. C. Dempsey; 3rd, Belleville F.G.A.
Tolman: 1st, Belleville F.G.A.; 2nd, Norfolk F.G.A.
Roxbury Russet: 1st, R. Thompson, 2nd, Norfolk F.G.A.; 3rd, Frank Dempsey.
Barrell, A. O. V., not named in Class 1: 1st, Norfolk F.G.A.; *Hubbardston*: 2nd, Harry Dempsey; 3rd, Belleville F.G.A.

(*b*) Standard boxes ready for shipment. (Fruit unwrapped.)

Blenheim: 1st, Oshawa F.G.A.
Gravenstein: 1st, Oshawa F.G.A.
Ontario: 1st, Frank Dempsey; 2nd, Harry Dempsey.
St. Lawrence: 1st, Oshawa, F.G.A.
Any other desirable variety not named in Class 1: 1st, C. W. Challand; 2nd, Norfolk F.G.A.; 3rd, Chatham F.G.A.

Class 3. Dessert Varieties. Plates of 5.

Fameuse: 1st. F. G. Stewart, Homer; 2nd, R. Cameron, Niagara Falls South; 3rd, Norfolk F.G.A.

Golden Russet: 1st, Chatham F.G.A.; 2nd, A. E. Tenbroeck, St. Catharines; 3rd, W. G. Watson, Dixie.
King: 1st, N. Brown, Eglinton; 2nd, W. G. Watson; 3rd, Norfolk F.G.A.
McIntosh: 1st, Frank Dempsey; 2nd, A. M. Smith, Port Dalhousie; 3rd, C. L. Stephens, Orillia.
Wealthy: 1st, J. B. Gutthrey; 2nd, W. G. Watson; 3rd, R. W. Thomson.
Spy: 1st, C. W. Challand; 2nd, N. Brown; 3rd, F. G. Stewart.
Spitzenburg: 1st, Norfolk F.G.A.; 2nd, C. W. Challand; 3rd, J. Tregunno & Sons, Bartonville.
Any other variety: 1st, R. W. Thomson, Ellesmere; 2nd, J. Tregunno & Sons; 3rd, W. W. Cox, Collingwood.
Any desirable Seedling: 1st, G. A. Robertson, St. Catharines; 2nd, P. C. Dempsey.

Class 4. Cooking Varieties. Plates of Five.

Alexander: 1st, Jno. D. McDonald, Cornwall; 2nd, P. C. Dempsey; 3rd, W. G. Watson.
Baldwin: 1st, R. Thompson; 2nd, N. Brown; 3rd, P. C. Dempsey.
Blenheim: 1st, J. B. Gutthrey; 2nd, W. G. Watson; 3rd, W. C. Reid, Belleville.
Cayuga: 1st, Norfolk F.G.A.; 2nd, J. G. Brown, Humber Bay; 3rd, J. Tregunno & Sons.
Greening: 1st, P. C. Dempsey; 2nd, W. H. Stevenson, Oshawa; 3rd, J. Tregunno & Sons.
King: 1st, C. W. Challand; 2nd, Chatham F.G.A.; 3rd, Norfolk F.G.A.
Ribston: 1st, A. R. Davison, Danforth; 2nd, A. W. Peart, Burlington; 3rd, Chas. Plunkett, Woodbridge.
Spy: 1st, C. W. Challand, Marburg; 2nd, Norfolk F.G.A.; 3rd, R. Thompson.
Any other desirable variety: 1st, Jno. L. Grosjean, Cobourg; 2nd, W. G. Watson; 3rd, C. W. Challand.
Any desirable Seedling: 3rd, P. C. Dempsey.

Class 5. Pyramids of Fruit.

Ben Davis: 1st, J. Tregunno & Sons; 2nd, Chatham F.G.A.; 3rd, W. G. Watson.
Baldwin: 1st, W. G. Watson; 2nd, Jas. E. Johnston; 3rd, J. B. Gutthrey.
Blenheim: 1st, W. G. Watson; 2nd, J. B. Gutthrey; 3rd, J. G. Brown.
Gravenstein: 1st, Oshawa F.G.A.
Fallawater: 1st, H. B. Gutthrey; 2nd, Chatham F.G.A.
Fameuse: 1st, J. B. Gutthrey; 2nd, Harold Jones; 3rd, P. C. Dempsey.
King: 1st, Oshawa F.G.A.; 2nd, A. R. Davison; 3rd, W. G. Watson.
McIntosh: 1st, G. C. Caston, Craighurst; 2nd, W. G. Watson; 3rd, W. M. Robson, Lindsay.
Ontario: 1st, P. C. Dempsey; 2nd, W. G. Watson; 3rd, J. B. Gutthrey.
Scarlet Pippin: 1st, G. C. Caston; 2nd, Harold Jones.
Spy: 1st, Jas. E. Johnson; 2nd, C. W. Challand; 3rd, W. G. Watson.
Wolf River: 1st, G. C. Caston; 2nd, Walter Forrester, Rugby.

PEARS.

Class 6. Plates of 5.

Anjou: 1st, R. Thompson,; 2nd, W. F. W. Fisher, Burlington.
Bosc: 1st, A. M. Smith, Port Dalhousie; 2nd, F. G. Stewart.
Clairgeau: 1st, Bernard Baker, Whitby; 2nd, F. G. Stewart
Diel: 1st, A. M. Smith; 2nd, F. G. Stewart.
Duchess: 1st, W. F. W. Fisher; 2nd, F. G. Stewart.
Hardy: 1st, J. G. Brown.
Howell: Bernard Baker; 2nd, A. M. Smith.
Keiffer: 1st, A. E. Tenbroeck, St. Catharines; 2nd, F. G. Stewart.
Lawrence: 1st, R. W. Newton; 2nd, A. M. Smith.
Winter Nelis: 1st, F. G. Stewart; 2nd, R. Thompson.
Any other variety: 1st, A. M. Smith; 2nd, J. G. Brown, Humber Bay.

Class 7. Export Varieties.

Boxes ready for shipment. (Fruit wrapped.)

Anjou: 1st, Geo. A. Robertson; 2nd, R. Thompson; 3rd, Biggs Fruit Co.
Bosc: 1st, F. G. Stewart; 2nd, R. Thompson; 3rd, Geo. A. Robertson.
Clairgeau: 1st, F. G. Stewart; 2nd, Geo. A. Robertson; 3rd, R. Thompson.
Duchess: 1st, R. Thompson; 2nd, F. G. Stewart; 3rd, Geo. A. Robertson.

Winter Nelis: 1st, F. G. Stewart.
Keiffer: 1st, A. E. Tenbroeck; 2nd, W. H. Bunting; 3rd, F. G. Stewart.
Lawrence: 1st, R. Thompson.
Any other variety: 1st, F. G. Stewart; 2nd, Geo. A. Robertson; 3rd, R. Thompson.

GRAPES.

Class 8.

Agawam: 1st, R. Thompson; 2nd, W. M. Robson, Lindsay: 3rd, F. G. Stewart.
Concord: 1st, R. Thompson; 2nd, F. G. Stewart; 3rd, Geo. A. Robertson.
Lindley: 1st, Geo. A. Robertson; 2nd, F. G. Stewart; 3rd, R. Thompson.
Niagara: 1st, R. Thompson; 2nd, F. G. Stewart; 3rd, Geo. A. Robertson.
Vergennes: 1st, F. G. Stewart; 2nd, R. Thompson; 3rd, Geo. A. Robertson.
Wilder: 1st, Geo. A. Robertson; 2nd, F. G. Stewart; 3rd, R. Thompson.
Any other desirable variety: 1st, R. Thompson; 2nd, W. M. Robson; 3rd, F. G. Stewart.
Basket Black Grapes: 1st, F. G. Stewart; 2nd, R. Thompson; 3rd, Geo. A. Robertson.
Basket Red Grapes: 1st, Geo. A. Robertson; 2nd, F. G. Stewart; 3rd, R. Thompson.
Basket White Grapes: 1st, Geo. A. Robertson; 2nd, F. G. Stewart; 3rd, R. Thompson.
Fancy Package, Black Grapes: 1st, Geo. A. Robertson; 2nd, R. Thompson; 3rd, F. G. Stewart.
Fancy Package, Red Grapes: 1st, R. Thompson; 2nd, F. G. Stewart; 3rd, Geo. A. Robertson.
Fancy Package, White Grapes: 1st, Geo. A. Robertson; 2nd, F. G. Stewart; 3rd, R. Thompson.

Class 9.

Display in Commercial Packages: 1st, Norfolk F.G.A.; 2nd, St. Catharines Cold Storage Co.; 3rd, Grantham, F.G.A.
Display (not in Commercial Packages): 1st, St. Catharines Cold Storage Co.; 2nd, Norfolk F.G.A.; 3rd, Grantham F.G.A.; 4th, Orillia Hort. Society.

PRESERVED FRUIT.

Class 10. Quart Sealer of Canned Fruit.

Blackberries: 1st, Mrs. T. Delworth, Weston: 2nd, Miss E. Gregory, Port Dalhousie; 3rd, Mrs. P. Depotie, St. Catharines.
Cherries, Black and Red: 1st, W. A. Emory, Aldershot; 2nd, Mrs. R. Thompson, 3rd, Mrs. F. G. Stewart.
Cherries, White or Yellow: 1st, Miss E. Gregory; 2nd, Mrs. F. G. Stewart; 3rd, Mrs. R. Thompson.
Gooseberries: 1st, Mrs. F. G. Stewart; 2nd, Mrs. R. Thompson; 3rd, Mrs. T. Delworth.
Grapes, Black or Red: 1st, J. G. Wait, Wicklow; 2nd, Mrs. P. Depotie; 3rd, Mrs. F. G. Stewart.
Grapes, White: 1st, Miss E. G. Gregory; 2nd, Mrs. P. Depotie, 3rd, Mrs. F. G. Stewart.
Peaches, White: 1st, Mrs. R. Thompson; 2nd, Mrs. F. G. Stewart; 3rd, Mrs. P. Depotie.
Peaches, Yellow: 1st, Mrs. F. G. Stewart; 2nd, Mrs. R. Thompson; 3rd, Jno. Downham, Strathroy.
Pears: 1st, Mrs. P. Depotie; 2nd, R. W. Thomson, Ellesmere; 3rd, W. A. Emory.
Plums, Blue or Red: 1st, Mrs. W. H. French, Oshawa; 2nd, N. Brown, Eglinton; 3rd, Miss E. G. Gregory.
Plums, Green or White: 1st, Mrs. W. H. French, Oshawa; 2nd, Mrs. P. Depotie; 3rd, R. W. Thomson.
Raspberries, Red: 1st, Mrs. F. G. Stewart; 2nd, Mrs. R. Thompson; 3rd, J. G. Wait.
Raspberries, Black: 1st, Mrs. F. G. Stewart; 2nd, Mrs. R. Thompson; 3rd, J. G. Wait, Wicklow.
Strawberries: 1st, W. A. Emory; 2nd, Mrs. R. Thompson; 3rd, Mrs. P. Depotie.

Class 11. Pint Jar of Jam.

Currant, Black: 1st, Mrs. F. G. Stewart; 2nd, Mrs. R. Thompson; 3rd, Miss L. Shuttleworth.
Gooseberry: 1st, Miss E. G. Gregory; 2nd, W. A. Emory; 3rd, N. Brown.
Grape: 1st, Mrs. J. W. Sparling; 2nd, Mrs. P. Depottie; 3rd, Miss E. G. Gregory.
Peach: 1st Mrs. P. Depotie; 2nd, Mrs. R. Thompson; 3rd, Mrs. F. G. Stewart.
Pear: 1st, Mrs. F. G. Stewart; 2nd, Mrs. R. Thompson; 3rd, Mrs. J. W. Sparling.

Plum: 1st, W. A. Emory; 2nd, Miss L. Shuttleworth; 3rd, Mrs. P. Depotie.
Raspberry: 1st W. A. Emory; 2nd, Miss E. G. Gregory; 3rd, Mrs. R. Thompson.
Strawberry: 1st Miss E. G. Gregory; 2nd, W. A. Emory; 3rd, Mrs. F. G. Stewart.

CLASS 12. PINT OF JELLY.

Apple: 1st, Mrs. P. Depotie; 2nd, Mrs. F. G. Stewart; 3rd, Miss L. Tasker, St. Catharines.
Crab Apple: 1st, Mrs. P. Depotie; 2nd, Miss E. G. Gregory; 3rd, Mrs. T. Delworth.
Red Currant: 1st, Miss E. G. Gregory; 2nd, Mrs. P. Depotie, 3rd, Mrs. F. G. Stewart.
Grape: 1st, Mrs. P. Depotie; 2nd, Mrs. F. G. Stewart; 3rd, Mrs. R. Thompson.
Quince: 1st, Mrs. R. Thompson; 2nd, Miss L. Shuttleworth; 3rd, Mrs. T. Delworth.
Raspberry, Red: 1st, Miss L. Shuttleworth; 2nd, Mrs. P. Depotie; 3rd, Miss E. G. Gregory.

CLASS 13. GRAPE JUICE. UNFERMENTED.

1st, W. A. Emory; 2nd, Mrs. Geo. Laing, Toronto; 3rd, Mrs. J. W. Sparling, Bowmanville.

COUNTY PRIZE LIST

BRANT:
Blenheim: 1st, J. W. Clark, Cainsville.
Golden Russet: 1st, J. W. Clark.
Greening: 1st, J. W. Clark.
King: 1st, J. W. Clark.
Mann: 1st, J. W. Clark.
Spy: 1st, J. W. Clark.
Seek: 1st, J. W. Clark.

ELGIN:
Baldwin: 1st, J. D. Webster. Sparta; 2nd, Arch. Maccoll.
Ben Davis: 1st, J. D. Webster.
Fallawater: 1st, J. D. Webster.
Golden Russett: 1st, Arch. Maccoll.
Spy: 1st J. D. Webster.

ESSEX:
Baldwin: 1st, Lorna Duke; 2nd, A. S. Fox, Olinda.
Ben Davis: 1st, A. S. Fox.
King: 1st, A. S. Fox.
Spy: 1st, A. S. Fox; 2nd, Blake R. Cohoe; South Woodslee.
Roxbury Russet: 1st, Blake R. Cohoe; 2nd, A. S. Fox.
Snow: 1st, Blake R. Cohoe.
Wagner: 1st, Adolphus S. Fox.

Seek: 1st, Blake R. Cohoe.
Any other variety: 1st, Lorna Duke; 2nd, A. S. Fox.

HALTON:
Baldwin: 1st, W. McMurray, Streetsville; 2nd, R. M. Peart, Freeman.
Blenheim: 1st, Jno. Wilson, Jr.; 2nd, R. M. Peart.
Cranberry: 1st, R. M. Peart.
Golden Russet: 1st, A. C. Cummins, Burlington; 2nd, W. F. McMurray.
Greening: 1st, R. M. Peart.
King: 1st, W. F. McMurray; 2nd, R. M. Peart.
Spy: 1st, R. M. Peart; 2nd, W. F. McMurray.
Ribston: 1st, R. M. Peart.
Roxbury Russet: 1st, R. M. Peart; 2nd, R. C. Fowler, Burlington.

HURON:
Baldwin: 1st, Kenneth Cameron: Lucknow; 2nd, Wm. Geddes, Belgrave.
Ben Davis: 1st, Geo. Fothergill; 2nd, K. Cameron.
Canada Red: 1st, E. B. Jenkins, Wingham; 2nd, Geo. Fothergill, Belgrave.
Fameuse: 1st, F. E. Bingham, Goderich; 2nd, F. Hogg, Seaforth.
Golden Russet: 1st, Geo. Leithwaite.

Greening: 1st, R. G. McGowan, Blyth; 2nd, A. W. Sloan, Blyth.
King: 1st, A. W. Sloan, Blyth; 2nd, R. McIlwain, Nile.
Spy: 1st, K. Cameron; 2nd, A. W. Sloan.
Ontario: 1st, R. McIlwain; 2nd, Geo. Fothergill,
Any other variety: 1st, J. B. Henderson, Seaforth; 2nd, R. G. McGowan, Blyth.

LAMBTON:
Canada Red: 1st, Geo. A. Gott, Arkona.

LEEDS AND GRENVILLE:
Alexander: 1st, Edwin Keeler, Maitland; 2nd, J. H. Warner, South Augusta
Baxter: 1st, J. H. Warner; 2nd, W. Warner, South Augusta.
Canada Red; 1st: Wm. Beddie, Prescott; 2nd, J. H. Warner.
Fameuse: 1st, Wm. Beddie; 2nd, J. H. Warner.
Golden Russet: 1st, Edwin Keeler; 2nd, Wm. Beddie.
McIntosh: 1st, Wm. Beddie; 2nd, John Towsley, South Augusta.
Scarlet Pippin; 1st, Edwin Keeler; 2nd, Fred. Keeler, Maitland.
Scott Winter: 1st, W. Warner; 2nd, Edwin Keeler.
Wealthy: 1st, Harold Jones; 2nd, W. Warner.
Tolman: 1st, John Towsley; 2nd, Edwin Keeler.

NORFOLK:
Baldwin: 1st, Norfolk F.G.A.; 2nd, C. W. Challand, Marburg.
Blenheim: 1st, C. W. Challand; 2nd, Norfolk F.G.A.
Fameuse: 1st, Norfolk F.G.A.; 2nd, C. W. Challand.
Golden Russet: 1st, C. W. Challand; 2nd, Norfolk F.G.A.

Greening: 1st, W. F. Olds, Simcoe; 2nd, Norfolk F.G.A.
King: 1st, C. W. Challand; 2nd, Norfolk F.G.A.
Spy: 1st, C. W. Challand; 2nd, Norfolk F.G.A.
Spitzenburg: 1st, C. W. Challand; 2nd, W. F. Olds.
Yellow Bellefleur: 1st, W. F. Olds; 2nd, Norfolk F.G.A.
Any other variety: 1st, C. W. Challand; 2nd, C. W. Challand.

NORTHUMBERLAND AND DURHAM:
Alexander: 1st, P. C. Dempsey, Trenton.
Baldwin: 1st, P. C. Dempsey; 2nd, H. C. Bowen, Newcastle.
Ben Davis: 1st, W. H. Gibson, Newcastle; 2nd, P. C. Dempsey.
Fameuse: 1st, P. C. Dempsey; 2nd, J. W. Moir, Campbellford.
Golden Russet: 1st, P. C. Dempsey; 2nd, Frank H. Hall, Wicklow.
Greening: 1st, P. C. Dempsey; 2nd, H. J. Scripture.
King: 1st, H. J. Scripture; 2nd, P. C. Dempsey.
McIntosh: 1st, P. C. Dempsey; 2nd, H. J. Scripture.
Spy: 1st, P. C. Dempsey; 2nd, Jno. L. Grosjean, Cobourg.
Wealthy: 1st, Geo. E. Bamsay, Welcome.

OXFORD:
Baldwin: 1st, Andrew McKay; 2nd, R. W. Newton, Woodstock.
Colvert: 1st, Craig Harris, Ingersoll.
Fameuse: 1st, Craig Harris.
Greening: 1st, Craig Harris; 2nd, R. W. Newton.
King: 1st, Craig Harris; 2nd, R. W. Newton.
Spy: 1st, R. W. Newton; 2nd, Craig Harris.
Seek: 1st, Andrew Horner, Plattsville; 2nd, Craig Harris.
Tolman: 1st, Andrew McKay, Woodstock; 2nd, Craig Harris.

PEEL:
Baldwin: 1st, Wm. Clements, Clarkson; 2nd, W. G. Watson, Dixie.
Blenheim: 1st, J. B. Gutthrey, Dixie; 2nd, W. G. Watson.
Fall Pippin: 1st, J. B. Gutthrey; 2nd, Wm. Clements.
Fameuse: 1st, W. G. Watson; 2nd, J. B. Gutthrey.
Golden Russet: 1st, W. G. Watson; 2nd, J. B. Gutthrey.
Greening: 1st, John Frank, The Grange; 2nd, Geo. Wilson, Churchville.
King: 1st, W. G. Watson; 2nd, Wm. Clements, Clarkson.
Spy: 1st, J. B. Gutthrey; 2nd, W. G. Watson.
Ontario: 1st, W. G. Watson; 2nd, J. B. Gutthrey.
Wealthy: 1st, W. G. Watson; 2nd, J. B. Gutthrey.

PRINCE EDWARD:
Baldwin: 1st, Frank Dempsey; 2nd, Harry Dempsey.
Cranberry: 1st, Harry Dempsey; 2nd, Frank Dempsey.
Fameuse: 1st, Frank Dempsey; 2nd, Harry Dempsey.
Gano: 1st, Harry Dempsey; 2nd, Frank Dempsey.
Golden Russet: 1st, Frank Dempsey; 2nd, Harry Dempsey.
Greening: 1st, Harry Dempsey; 2nd, Frank Dempsey.
McIntosh: 1st, Harry Dempsey; 2nd, Frank Dempsey.
Spy: 1st, Frank Dempsey; 2nd, Harry Dempsey.
Stark: 1st, Frank Dempsey; 2nd, Harry Dempsey.

EAST SIMCOE:
Alexander: 1st, G. C. Caston.
Baxter: 1st, G. C. Caston.
Fameuse: 1st, W. T. Lee, Orillia; 2nd, W. Forrester, Rugby.
Golden Russet: 1st, W. A. Forrester; 2nd, R. A. Lehmann.
McIntosh: 1st, W. T. Lee; 2nd, Harry Wood, Ardtrea.
Spy: 1st, C. L. Stephens.
Wealthy: 1st, W. Forrester; 2nd, Robt. Street, Orillia.
Wolfe: 1st, Wm. Bacon, Orillia; 2nd, Harry Wood, Ardtrea.
Any other variety: 1st, J. H. Overend, Warminster; 2nd, W. T. Lee.

STORMONT, DUNDAS AND GLENGARRY:
Alexander: 1st, Jno. D. McDonald, Cornwall; 2nd, Ernest McDonald, Cornwall
Baxter: 1st, Jno. D. McDonald; 2nd, Jno. D. Campbell, Cornwall.
Fameuse: 1st, Jno. D. McDonald; 2nd, Nicholas Everetts, Iroquois.
Golden Russet: 1st, N. Everett; 2nd, E. McDonald.
McIntosh: 1st, N. Everetts; 2nd, Jno. D. McDonald.
Greening: 1st, Jno. A. McDonell.
Scott Winter: 1st, Jno. D. Campbell; 2nd, Jno. D. McDonald.
Wealthy: 1st, Jno. D. Campbell; 2nd, Jno. D. McDonald.
Wolfe: 1st, E. McDonald; 2nd, Jno. D. McDonald.
Any other Variety: 1st, A. D. Harkness; 2nd, A. D. Harkness.

VICTORIA:
Alexander: 1st, W. M. Robson, Lindsay.
Fameuse: 1st, W. M. Robson. 2nd, Bowen Bros. Valentia.
Greening: 1st, Bowen Bros.
King: 1st, J. O. Swain, Valentia. 2nd, Bowen Bros.
McIntosh: 1st, R. E. Thurston; 2nd, W. M. Robson.
Golden Russet: 1st, J. O. Swain; 2nd, Bowen Bros.
Spy: 1st, J. O. Swain; 2nd, Jno. Beecroft. Sonya.
Wealthy: 1st, E. L. Thurston, Bobcaygeon; 2nd, Jno. Beecroft.
Yellow Bellefleur: 1st, J. O. Swain; 2nd, W. M. Robson.
Any other variety: 1st, J. O. Swain; 2nd, J. O. Swain.

WENTWORTH:
Baldwin: 1st, Franklin Baker, Waterdown. 2nd. J. Tregunno & Sons, Bartonville.
Ben Davis: 1st, J. Tregunno & Sons. 2nd, Franklin Baker.
Blenheim: 1st, Franklin Baker; 2nd, J. J. Green, Waterdown.
Cranberry Pippin: 1st, Franklin Baker; 2nd, J. J. Green.
Golden Russet: 1st, Murle Ryckman; 2nd, J. J. Green.
Greening: 1st, J. Tregunno & Son; 2nd, J. J. Green.
Hubbardston: 1st, J. Tregunno & Sons; 2nd, Franklin Baker.
King: 1st, Franklin Baker. 2nd, J. Tregunno & Sons.
Spy: 1st, J. Tregunno & Sons; 2nd, Franklin Baker.
Snow: 1st J. Tregunno & Sons; 2nd, Murle Ryckman.

YORK.
Alexander: 1st, J. G. Brown Humber Bay; 2nd, Luke Gibbons.
Blenheim: 1st, A. R. Davison; 2nd, J. G. Brown.
Fumeuse: 1st, R.W. Thomson, Ellesmere; 2nd, W. H. Stone, Bond Head
Golden Russet: 1st R. W. Thompson; 2nd, Chas. Plunkett.
Greening: 1st, W. H. Stone; 2nd, N. Brown.
King: 1st, A. R. Davison; 2nd, J. B. Lawrie.
Spy: 1st, R. W. Thomson; 2nd, W. H. Stone.
St. Lawrence: 1st, Chas. Plunkett; 2nd, J. G. Brown.

CONSTITUTION AND BY-LAWS.

REVISED CONSTITUTION AND BY-LAWS OF THE FRUIT GROWERS' ASSOCIATION OF ONTARIO.

Preamble.

The objects of the Fruit Growers' Association of Ontario shall be the advancement of the science and art of horticulture in all its branches.

(*a*) By holding an Annual Convention for the consideration of questions relating thereto.

(*b*) By co-operating in every possible way with district and local fruit growers' associations and horticultural societies hereinafter mentioned.

(*c*) By collecting, arranging and disseminating useful information.

(*d*) By co-operating with the Ontario Department of Agriculture in all matters pertaining to the advancement of horticulture.

(*e*) By holding an annual exhibition of fruit and other horticultural products and awarding premiums in connection with the same.

(*f*) And by such other means as may from time to time seem desirable.

Name.

1. This Association shall be called the Fruit Growers' Association of Ontario, and hereafter in this Constitution shall be referred to as the Ontario Association.

Membership.

2. Any person interested in horticulture may become a member by payment of one dollar per annum in advance to the general secretary, or by paying the necessary fee to the secretary of any district or local association in affiliation with the Ontario Association. A single payment of $10.00 to the general secretary shall constitute a member for life.

3. Members of the Ontario Association in good standing shall be entitled to receive regularly the official organ of the Association, a copy of the Annual Report, such other literature as may be sent out by the Association from time to time and any other privileges that may be provided or arranged for by the Association.

4. The Association financial year shall end on the 31st of December.

Annual Meeting.

5. The Annual Meeting shall be held at such time and place as may be designated by the Ontario Association.

Officers.

6. A President, Vice-President, Secretary-Treasurer and Directors only shall be the duly qualified officers of the Ontario Association.

7. The Directors shall be elected by ballot at the morning session of the last day of the Annual Meeting, and shall be thirteen in number, representing the thirteen Horticultural Divisions as set forth in Schedule A of this Constitution. The newly elected Board of Directors shall not take office till the second Tuesday in January of the year following, when the report of the retiring Executive and the Treasurer shall be received. Those four Directors who have occupied positions on the Board of Directors for the longest period shall not be eligible for re-election. These Directors shall, however, be eligible for re-election at the end of one year.

8. The newly elected Directors shall at their first meeting appoint from among their number a President and a Vice-President, and also from among themselves or otherwise, a Secretary-Treasurer.

9. The President, Vice President, Secretary-Treasurer and two other members appointed by the Directors shall constitute the Executive Committee of the Ontario Association.

Duties of Officers.

10. It shall be the duty of the President to preside at all meetings of the Ontario Association, decide all questions of order, and make any suggestions he may deem

necessary in the interests of the Association. He shall be, *ex-officio*, a member of all committees appointed.

11. In the absence of the President, the powers and duties of his office shall devolve upon the Vice-President.

12. It shall be the duty of the Secretary-Treasurer to attend all meetings of the Ontario Association, the officers and the Executive, and keep correct minutes of the same; conduct all correspondence and issue all press and other reports; prepare the report of the Executive Committee for the Annual Meeting; forward the list of representatives to the Secretaries of Fair Associations, also prepare for publication the Annual Report. As Treasurer, he shall receive and account for all moneys belonging to the Association, pay such bills and accounts as have been approved by the Executive. He shall have the power of Managing Director acting under the control and with the approval of the Executive.

13. By virtue of his office he shall be a member of each committee appointed.

14. Before entering upon the duties of his office, he shall enter into a bond, with security when required, which shall be approved of by the Directors.

15. The accounts of the Ontario Association shall be audited by an expert auditor or accountant appointed by the Executive Committee, and approved by the Minister of Agriculture for Ontario.

16. At each Annual Meeting, the retiring executive officers shall present a full report of their proceedings to the Ontario Association. A detailed statement of the receipts and expenditures for the previous year, and of assets and liabilities, a list of members and such information on matters of special interest to this Association as the officers may have been able to obtain, shall be sent to the Minister of Agriculture for Ontario within forty days after the holding of such Annual Meeting.

17. The Executive Committee shall carry into effect the plan of work decided upon by the officers, and shall arrange the details of the same.

18. The officers, or the members of the Executive, or of any Committee may conduct by correspondence, the duties assigned to said officers, Executive or Committee, by the Constitution and By-laws, or by the Association, when such a course is deemed advisable by said officers, Executive or Committee.

19. In case a vacancy occurs in the officers or directorate, the Executive Committee may fill said vacancy forthwith.

Committees.

20. The Association may appoint such committees from time to time as may be deemed expedient, and the first person named thereon shall be declared chairman of each committee.

21.—(*a*) The actual and reasonable expenses of officers and members of committees when attending meetings in the interests of the Association shall be defrayed out of the funds of the Association.

(*b*) The railway fare only of the Directors in attending the Annual Meeting shall be paid by the Ontario Association.

Notice of Meeting.

22.—(*a*) At least two weeks' notice shall be given of each annual and general meeting, naming time and place of meeting. Notice may be given through the public press and by circular letter mailed to each member.

(*o*) An officers' meeting shall be called by mailing at least ten days before date of meeting to each officer, a notice of meeting as above provided.

(*c*) Similar notice shall be given to each member of the Executive before an Executive meeting is held.

(*d*) An Executive meeting may be held on shorter notice, provided each officer is otherwise notified and consents thereto.

Quorum.

23.—(*a*) Not less than ten members shall be a quorum to transact business for the Association; not less than five members shall be a quorum at an officers' meeting; and not less than three members shall be a quorum at an Executive meeting.

(*b*) Any member of the Directorate or Executive not present at a meeting, if he send his views in writing, shall be considered as present.

Affiliated Associations.

24. Fruit Growers in any section of Ontario may form a local Association when it has a membership of ten or over, upon the payment to the Treasurer of the Ontario

Association of $5.00 for the first twenty-five members or fraction thereof above nine, and twenty-five cents per member for every additional member, which payment shall entitle the members to all the privileges and advantages of membership in the Ontario Association.

25. It shall be the duty of the officers and directors of the Ontario Association to encourage the formation of such local Associations.

26. Fruit Growers who are members of two or more local Associations shall be accepted as members of the Ontario Association from that affiliated Association only which is the first to forward the membership fee to the Secretary-Treasurer of the Ontario Association.

27. Such affiliated Associations may appoint one delegate to the Annual Meeting of the Ontario Association for the first twenty-five members or fraction thereof, and an additional delegate for every twenty-five members or major portion thereof above the first twenty-five. The actual railway fare of said delegate in attending the Annual Meeting shall be paid by the Ontario Association.

Change of Constitution.

28. This constitution and by-laws may be amended by a majority of members present at an Annual Meeting or a special meeting called for the purpose of considering the same, and of which two weeks' notice shall be given.

Schedule A.—Horticultural Divisions.

1. Counties of Renfrew, Lanark, Carleton, Russell and Prescott.
2. Counties of Glengarry, Stormont, Dundas, Grenville, Leeds and Frontenac.
3. Counties of Lennox and Addington, Hastings and Prince Edward.
4. Counties of Northumberland, Durham, Peterboro' and Victoria.
5. Counties of Ontario and York.
6. Counties of Peel and Halton.
7. County of Wentworth.
8. County of Lincoln.
9. Counties of Welland, Haldimand, Norfolk and Elgin.
10. Counties of Kent, Essex, and Lambton.
11. Counties of Middlesex, Huron and Bruce.
12. Counties of Brant, Oxford, Perth, Waterloo, Wellington and Dufferin.
13. Counties of Grey, Simcoe, Muskoka, Parry Sound, Nipissing, Algoma and Manitoulin.

Fourteenth Annual Report

OF THE

Fruit Experiment Stations

of Ontario

UNDER THE JOINT CONTROL OF

THE ONTARIO AGRICULTURAL COLLEGE, GUELPH

AND

THE FRUIT GROWERS' ASSOCIATION OF ONTARIO

1907

PUBLISHED BY THE ONTARIO DEPARTMENT OF AGRICULTURE, TORONTO

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TORONTO, 1908.

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TORONTO.

To the Honorable SIR WILLIAM MORTIMER CLARK, K.C.,
Lieutenant-Governor of the Province of Ontario.

MAY IT PLEASE YOUR HONOR:

I have the pleasure to present herewith for the consideration of your Honor the Report of the Fruit Experiment Stations for 1907.

Respectfully yours,

NELSON MONTEITH,
Minister of Agriculture.

TORONTO, 1908.

FRUIT EXPERIMENT STATIONS.

BOARD OF CONTROL.

G. C. Creelman, B.S.A., President of the Ontario Agricultural College, Chairman ..... Guelph.
H. L. Hutt, Professor of Horticulture ..... Guelph.
W. T. Macoun, Horticulturist at Central Experimental Farm ..... Ottawa.
A. M. Smith, Director of Ontario Fruit Growers' Association ..... Port Dalhousie.
G. A. Robertson, Director of Ontario Fruit Growers' Association ..... St. Catharines.
P. W. Hodgetts, Secretary of Ontario Fruit Growers' Association ..... Toronto.
Linus Woolverton, M.A., Secretary ..... Grimsby.

EXECUTIVE COMMITTEE.

G. C. Creelman ..... Chairman.
L. Woolverton, Prof. H. L. Hutt ..... Inspectors.
P. W. Hodgetts ..... Secretary O. F. G. A.

THE ONTARIO FRUIT EXPERIMENT STATIONS.

	Name.	*Speciaity.*	*Experimenter.*
1.	Southwestern	Peaches	J. L. Hilborn, Leamington.
2.	Essex	Vegetables	E. E. Adams, Leamington.
3.	Wentworth	Grapes	Murray Pettit, Winona.
4.	Burlington	Blackberries and Currants	A. W. Peart, Burlington.
5.	Lake Huron	Raspberries, Gooseberries and Plums	A. E. Sherrington, Walkerton.
6.	Simcoe	Hardy Apples and Hardy Cherries	G. C. Caston, Craighurst.
7.	Bay of Quinte	Apples	W. H. Dempsey, Trenton.
8.	St. Lawrence	Hardy Plums and Hardy Pears	Harold Jones, Maitland.
9.	Algoma	Hardy Fruits	Chas. Young, Richard's Landing.
10.	Maplehurst	General Collection of Cherries, Peaches, Grapes and Pears for comparative study	The Secretary.

CO-OPERATIVE WORK.

Strawberries ..... Rev. E. B. Stevenson, 270 Grange Street, Guelph.
Vegetables and Strawberries ..... Prof. H. L. Hutt, O.A.C., Guelph.
Hardy Fruits ..... W. T. Macoun, C.E.F., Ottawa.
" ..... C. Chapman, Judge, Ont.

Fruit Experiment Stations, 1907.

THE SECRETARY'S REPORT.

By Linus Woolverton, Grimsby.

In accordance with the instructions of the Board of Control, some special varieties of fruits were sent out to the Fruit Stations for testing:—

Varieties Ordered for Stations.

Apples: From Mr. W. T. Macoun, Horticulturist of the Central Experimental Farm, the following varieties of apples were sent to Chas Young, Algoma Station, at Richard's Landing: Forest, Okabena, Adonis, Crusoe, Galetta, Mendel, Navan, Noel, Ottawa. Of these Mr. Macoun says: The last seven varieties mentioned are our own seedlings, all of which are quite promising.

Currants: With the object of testing the suitability of currants as a commercial crop in certain sections, the following collection was ordered from Mr. Joseph Tweddle, Fruitland, to be sent to G. C. Caston, Simcoe Station, Craighurst; C. Chapman, Co-operative Experimenter in Temiskaming District, Judge, Ont.; Chas. Young, Algoma Station, Richard's Landing; H. Jones, St. Lawrence Station, Maitland, and J. L. Hilborn, Southwestern Station, Leamington, Ont., viz:—

20 Black Victoria, 20 Naples, 20 Champion, 15 Fays, 5 Cherry, 5 Wilder, 5 Chautauqua, 5 Versailles, 5 White Grape.

Strawberries: There was also sent them the following collections of 1,000 plants of strawberries from E. B. Stevenson, Guelph, for the purpose of giving them a fair commercial test, viz.:—

Splendid, Senator Dunlop, Tennessee Prolific, Three W's, Cardinal, Sample, Ruby, Fountain.

To C. Chapman, Judge, Ont., near New Liskeard, the following collection of hardy stock was ordered from E. D. Smith, Nurseryman, Winona, viz.:—

Apples: Alexander, Astrachan, Charlamoff, Duchess, Hibernal, Hyslop, Longfield, Martha, Patten's Greening, Scott, Wealthy, Wolf, Transparent.

Blackberries: Agawam, El Dorado, Snyder.

Cherries: Montmorency, Orel, Richmond.

Gooseberries: Downing, Pearl, Red Jacket.

Grapes: Brighton, Champion, Diamond, Moore, Moyer.

Pears: Flemish Beauty.

Plums: Burbank, De Soto, Forest Rose, Hammer, Hawkeye, Milton, Whittaker.

Raspberries: Conrath, Herbert, Hilborn, Marlboro, Shaffer.

To all the Fruit Stations, twelve each of the Herbert raspberry and two each of the Spencer Seedless Apples were also ordered.

For the purpose of carrying out a special experiment in the County of Essex of growing peach trees on plum-roots for hardiness to prevent root killing by frost, 500 Myrobalan, 500 Americana, and seedling plum stocks were ordered from the Shenandoah Nurseries in Iowa. Mr. A. M. Smith, an experienced nurseryman, was engaged to bud these seedlings for the

Board to the leading varieties of peaches. Two or three hundred were large enough for receiving buds, and the balance will need to be carried over for another season.

New Ontario.

The outlook for the success of tree fruits in New Ontario is not very encouraging, as appears from the following extract from Mr. Chapman's letter of May 28th, 1907: "The trees received last year looked well in April, but the cold and snow during the fore part of May seemed to hurt them. I will report later how they stood the winter. The mercury went down to 55 degrees below zero last winter, and if they come out all right I think they will stand anything." On July 16th he writes: "I am very sorry to say that the frost killed all the apple trees I planted last year, except one tree, and I have only three plum trees out of the dozen that are alive."

The Fruit Station Exhibit at Massey Hall.

At a meeting of our Board of Control in December, 1905, it was resolved "that in the opinion of the Board it is highly desirable that the Fruit Experiment Stations of Ontario, the Ontario Agricultural College, and the Central Experimental Farm make their special educative exhibits in conjunction at the Fruit, Flower and Honey Show, and therefore we hereby petition the Management of the said Show to provide in one room and side by side such space as may be desired by the said institution for such educative exhibits. We estimate that not less than 700 square feet of table room will be required."

Unfortunately, at both the exhibitions following, viz., in November, 1906, and in November, 1907, this request of the Board could not be granted owing to lack of space. At the latter, five of our stations, the Central Experimental Farm, and the Women's Institute had their space in conjunction, upstairs; but four of our stations were crowded into a side table in the basement, with scarcely space to keep the varieties separate, let alone show them to advantage; while the interesting Agricultural College exhibit was placed in another part of the hall entirely. No doubt we shall in time have a commodious horticultural building in Toronto, in which case the wishes of our Board will be complied with, viz., to make these exhibits under the auspices of the Department of Agriculture of that real educational value which was intended.

Speaking of our Fruit Stations in the order of their exhibits we had the following on the main floor:

Burlington Station.

Mr. A. W. Peart showed the following list of varieties:

Southern varieties, of Apples, which have borne only two crops and are not yet sufficiently tested to be divided into desirable and undesirable: Black Ben Davis, Blue Pearmain, Bonum, Belmont, Carter's Blue, Cullasaga, Gill's Beauty, Gilbert, Housley's Winesap, Highfile, Huntsman, Kentucky Tolenstein, L. S. Pearmain, Little's Red Winter, Milam, Minnesota Pippin, Malinda, Nickajack, Ozark, Penn Red Streak, Red Limbertwig, Rebel, Swaar, Wandering Spy.

Apples desirable: Blenheim Pippin, Seek No Further, Baldwin, Greening, King, N. Spy, Ribston Pippin, Cranberry.

Apples not desirable: Holland Pippin, Golden Russet, Pewaukee, Roxbury Russet, Snow, Ontario.

Pears desirable: Anjou, Clairgeau, Duchess, Josephine, Keiffer, Winter Nelis.

Cherries desirable: May Duke, Windsor, Early Richmond, Montmorency, English Morello, Common red.

Requiring further test: Napoleon, Louis Phillipe.

Pears desirable: Giffard, Wilder.

Plums desirable: Bradshaw, Glass Seedling, H. R. Purple Egg, Abundance, Burbank, Red June.

Requiring further test: Prince of Wales, America, Chabot, Willard, Wickson.

Currants desirable: Cherry, Fay, North Star, Prince Albert, Victoria Wilder. Black: Collins Prolific, Naples, Saunders, Lee. White: Grape and Imperial.

Not desirable: Belle de St. Giles, Brayley, Crandall, Raby Castle, Red Dutch.

Requiring further test: Baldwin, Beauty, Boskop's Giant, Comet, Perfection, Pomona, Red Cross, Standard, Success, Versailles, Black Victoria.

One jar variegated tomatoes.

One jar fruit of Mulberry.

An extra jar of Montmorency Cherries.

Note: The above lists of fruits desirable are in the nature of things only partial. For example, Bartlett Pears and Lombard Plums were not shown in the bottles. For complete lists of desirable fruits, see Station report, 1907.

Mr. Peart's bottled fruits were beautifully preserved by the use of one-half per cent. of formalin in water. One bottle of Montmorency cherries, containing a branch about ten inches long laden with 35 fine large specimens, was worthy of especial notice.

As with all our exhibits, specially recommended commercial varieties of apples were shown in pyramids in order to attract the eye, while less important kinds were shown in plates. The fruits from top grafted scions of some two dozen Southern varieties of apples shown by Mr. Peart were very inferior to the varieties we grow in Ontario, going to show that varieties which succeed best in one latitude are not always equally desirable in another.

Lake Huron Station.

Mr. A. E. Sherrington showed the following varieties:—

Apples: Astrachan, American Pippin, Baldwin, Ben Davis, Canada Baldwin, Fameuse, Greening, Gravenstein, Grime's Golden, Hulbert, Hyslop, King, La Victoire, McIntosh, Mann, NorthWestern Greening, Ontario, Peter, Pewaukee, Russet, Ribston, Scarlet Pippin, Spy, Spencer, Seek, Stark, Salome, Spitzenburg Tolman, Transcendent, Wine-Sap, Wealthy, Yellow Transparent, Yellow Harvest.

Plums: Abundance, American, Arch Duke, Burbank, Bradshaw, Coe, Duanes' Purple, Field, Gueii, Giant Prune, Imperial Gage, Lombard, Lincoln, Monarch, Moore's Arctic, McLaughlin, Niagara, Ogon, Englebert, Pond's Seedling, Purple Egg, Quackenboss, Red June, Shipper's Pride, Smith's Orleans, Spaulding, Saunders, Victoria Yellow Egg, Seedling.

Cherries: Dyehouse, English Morello, Early Richmond, Empress Eugenie, Late Duke, Montmorency, Olivet, Ostheim, Wragg, Yellow Spanish.

Pears: Citron de Carmes, Clairgeau, Goodale, Louise Nouvelle Fulvie.

Raspberries: Cuthbert, Conrath, Golden Queen, Hilborn, Herbert, Turner.

Blackberries: Agawam, Eldorado, Gainor, Lucretia.

Currants: Champion, Cherry, North Star, Naples, Prince Albert, Perfection, Pomona, Red Cross, Raby Castle, Saunders, Versailles, Victoria, Wilder, White Grape, White Imperial.

Gooseberries: Crown Bob, Champion, Downing, Industry, Keepsake, Pearl, Red Jacket, Whitesmith.

Strawberries: Brandywine, Matilda, Michels, Saunders, Smith No. 1, Strawberry-Raspberry.

He showed three baskets of apples neatly packed for shipment, viz., Snow, Scarlet Pippin, and Peter. The latter, he claims, does not drop quite so badly as the Wealthy, which it much resembles. He showed the Perfection Currant in his large collection of bottled summer fruits; this variety cost $3 for six plants, but one year's trial shows no superiority to warrant the extravagant title.

Simcoe Station.

Mr. G. C. Caston showed six pyramids, being samples of what he considered the best commercial varieties of apples for his district, as follows:—

Desirable Commercial Apples: Baxter, Fallawater, Golden Russet, King, Peerless and Snow.

All these were creditable samples, and were much studied by visitors. He also showed as desirable Spy, Baldwin, Greening, McIntosh, Scarlet Pippin, Gano, Seek, Canada Red, Canada Baldwin, Steele's Red, Wolf, Alexander, St. Lawrence, Ontario and Princess Louise.

Not Desirable: Gideon, Cooper's Market, Arabka, Fanny, Aiken's Red, Hamilton and Clayton.

His Peerless again deserves special notice, for it is as attractive as the Duchess, later in season, and very uniform in size and grade, tree run. This variety might well be tested everywhere. His Baxters were large and highly colored, and Mr. Caston claims that this apple is profitable for the colder sections. His Fallawaters were also worthy of especial mention. The Scarlet Pippins too are remarkably well grown by Mr. Caston, for scions procured by him from the St. Lawrence Station, the home of the variety, bore fruit this season with which Mr. Caston took a first prize over Mr. Jones.

Wentworth Station.

Mr. M. Pettit showed the following list of varieties:—

Grapes Desirable: Agawam, Campbell, Champion, Delaware, Lindley, Moore's Diamond; Niagara, Worden, Vergennes.

Valuable: Brighton, Dr. Collier, Diana, Early Victor, Eumelan, Isabella, Moore's Early, Massasoit, Pocklington, Requa, Roger 43, Roger 44, Salem, Wyoming Red.

Not Desirable: Anderson, America, August Giant, Amber Queen, Aminia, Arnold, Alvey, Alice, Black Delaware, Black Pearl, Bacchus, Belle, Beacon, Brockman, Brilliant, Beauty, Golden Drop, Goethe, Green Mountain, Green's Golden, Gærtner, Geneva, Highland, Hermann, Hayes, Janesville, Jessica, Kensington, Creveling, Croton, Cottage, Cynthiana, Canada, Duchess, Dracut Amber, Empire State, Early Dawn, Elvira,

El Dorado, Eaton, Esther, Etta, Eumelan, Elicand, Marion, Maxatawny, Moyer, Mason Seedling, Martha, Montgomery Northern Light, Noah, Olitie, Oriental, Oneida, Poughkeepsie Red, Lady Washington, Lutie, Lady, Mills, Watt, Woodruff Red, Black July, Black Pearl, Clinton, Perkins, Prentiss, Rockwood, Rommel, Roger 13, Roger 7, Roger 41, Rebecca, Transparent, Triumph, Ulster Prolific.

This was a very creditable collection, and occupied a table 18 ft. long and all arranged in good taste. A few kinds, such as Goethe, must have necessarily been ringed in order to have them so well ripened in such an unfavorable season; indeed, there are several varieties which are really improved for our climate by judicious ringing. Good samples were shown of Kensington, one of Dr. Saunders' Seedling. We could see very little difference between his Alice and his Diana, although the former is being sold as a new and distinct variety. He showed Early Victor, a very early sweet black grape, quite productive and possibly a very early salable market variety. His Lindley's were exceptionally fine in bunch; indeed if such samples could be grown every season, it would be our most popular red, market grape. It is excellent in flavor, early in ripening and large in berry. His Requa were very fine, and also his Campbell.

Algoma Station.

Mr. Chas Young sent down a box containig the following varieties, which we placed on the table and duly labelled:—

Apples: Alexander, Astrachan, Basil the Great, Canada Red, Charlamoff, Colvert, Duchess, Gideon, Hyslop. Isham, Louise, Longfield, Martha, McIntosh, North Star, Oriel, Peter, Peach, Snow, St. Lawrence, Switzer, Scott's Winter, Tolman, Walbridge, Wolf River.

He writes that he is planting and top grafting thirty other varieties for comparison, and claims that the number of kinds in bearing orchard in Algoma is no hindrance to Commercial success, for any apples that will fill an eleven quart basket sell readily in nearby markets.

St. Lawrence Station.

Mr. Harold Jones placed on the tables from his station five pyramids of desirable commercial apples and thirty-one varieties of apples not specially recommended for his district as follows:—

Apples (in pyramids) *Desirable*: Baxter, Fameuse, McIntosh, Milwaukee and Scarlet Pippin.

Not Valuable in St. Lawrence District: Aiken's Red, Blunt, Bellflower, Boiken, Canada Red, Downing, Excelsior, Golden Russet, Hamilton, Hurlburt, Gano, McMahon, Mammoth Black Twig, Magog, Milding, N. W. Greening, Pomme Grise, Plumb's Cider, Parlin's Beauty, Pewaukee, Rome Beauty, Roman Stem, Salome, Shiawassie, Scarlet Pippin, Scott, Shackleford, Tolman, Wismer, Winesap, Wealthy.

The Bay of Quinte Station.

Mr. W. H. Dempsey showed the following extended list of varieties:—

Desirable: Alexander, Banana, Blenheim, Baldwin, Ben Davis, Coo's River Beauty, Cranberry, Carolina Beauty, Downing, Fallawater, Fameuse, Greening, Golden Russet, McIntosh Red, Madoc, Nonsuch, Ontario, Rox

Russet, Ribston Pippin, Rome Beauty, Scarlet Pippin, Stark, Saxon, Seek, Shiawassee, Spy, Trenton, Wealthy, Walter, Wolf River, Windsor Chief, York Imperial.

Not Desirable: Autonovka, Bailey Sweet, Bellflower, Bismark, Cabashea, Cooper's Market, Gano, Golden Ball, Golden White Kentish Fillbasket, Landsburger, Longfield, Lord Burleigh, Minkler, Milding, Mammoth Pippin, Maggie's Favorite, Pewaukee, Sutton's Beauty, Scott's Winter, Vermont Sweet, Winesap.

Essex Vegetable Station.

Mr. E. E. Adams, who has only begun work in experimentation of vegetables, made a fairly good exhibit, considering the unfavorable conditions. The following are the varieties shown:—

Desirable.

Water Melon—Halbert Honey.

Musk Melons—Rocky Ford, Long Island Beauty, Unsworth's Perfect, Burrell's Gem, Osage, Ideal the Grand, Model.

Lettuce for forcing under glass—Grand Rapids.

Red Peppers—Long Cardinal, Long Cayenne.

Green Peppers—Chinese Giant, Neapolitan Early.

Onions—Prizetaker, Yellow Globe Danvers, Large Red Wethersfield.

Celery—Paris Golden, White Plume.

Sweet Potatoes—Jersey Sweets.

Tomatoes—Earliana, Plentiful, Stone, Royal Red, Chalk's Early Jewel, Atlantic Prize.

Citron—Colorado Giant.

Not Desirable.

Sweet Potatoes—Yellow Nansemond, Virginia Sweets, Vineless.

Tomatoes—Early Michigan, Livingston's New Globe, Matchless Swedesboro, Moore's King of the Earlies.

Musk Melons—Early Hackensack, Tip Top, Grand Rapids, Early Ripe, Champion Market.

Celery—Triumph.

Peppers—Procapp's Giant, very rough and ill-shaped.

Cost of the Fruit Stations, 1907.

Considering the extent of the work acomplished by the ten stations in operation during the year 1907, with about fifty acres in all devoted to testing varieties, the whole cost is very small. The Secretary's memoranda of expenditure for the year are as follows: Experimenters, $1,712.50; Inspector, $100; Secretary, $300; Board meetings, $112.44; fruit exhibits, $345.84; stock for stations, $226.91; freight, express and duty, $21.86; postage, $10; photos of fruit, $2.10; copying report (5 copies), $11; total $2,842.65.

Extent of the Work.

The following tabular statement gives an approximate idea of the number of acres occupied by our stations in experimental work, the number of

varieties that have been under test, and the special fruits to which each experimenter has been asked to devote especial attention:

Name of Station.	Name of experimenter.	No. of varieties	No. of acres.	Specialties.
Wentworth	M. Pettit	200	3	Grapes
Bay of Quinte	W. H. Dempsey	200	5	Apples
Southwestern (fruit)	J. L. Hilborn	100	5	Peaches
(vegetables)	E. E. Adams	100	2	Vegetables
Burlington	A. W. Peart	300	2½	Currants and Blackberries Commercial Pears
Lake Huron	A. E. Sherrington	200	4	Raspberries and Gooseberries
Georgian Bay	John Mitchell	300	5	Plums
Simcoe	G. C. Caston	220	5	Hardy Plums Hardy Cherries
St. Lawrence	H. Jones	200	5	Hardy Plums Hardy Pears
Maplehurst	L. Woolverton	700	10	General collection
Strawberry Station	E. B. Stevenson	150	1	Strawberries
Algoma	Chas. Young	200	4	Hardy Fruits
New Ontario	C. Chapman	100	.....	Hardy Fruits
		2,970	51½	

THE ANNUAL MEETING.

The annual meeting of the Board of Control was held at the Parliament Buildings, Toronto, on Monday 13th January, 1908, at 11 o'clock a.m. There were present G. C. Creelman, P. W. Hodgetts, Prof. H. L. Hutt, W. T. Macoun, A. M. Smith, G. A. Robertson, and Linus Woolverton.

The minutes of the last meeting were read and approved. Correspondence was read by the Secretary from E. E. Adams, Leamington, accepting his appointment as experimenter in vegetables for the Lake Erie district, and proposing plans for increasing the interest in his vegetable exhibit at Massey Hall, in 1908; also from J. L. Hilborn accepting his appointment as experimenter in fruits for the Lake Erie district; from Mr. C. C. James, Deputy Minister of Agriculture, regarding the proposed change in the name on our report to cover vegetables as well as fruits; from W. H. Dempsey, Trenton, resigning his position as experimenter in apples for the Bay of Quinte district; and from the Hon. Nelson Monteith, to the effect that the work of this Board would in future be combined with that of the Advisory Board of the Jordan Horticultural Station. The following is a copy of the letter:

TORONTO, Jan. 7th, 1908.

Mr. L. WOOLVERTON *Secretary of the Board of Control.*

DEAR SIR,—I should be glad if, at the forthcoming meeting of the Board of Control of the Fruit Experiment Stations, you would kindly intimate to the Board my decision in regard to the direction of these stations for the future.

Now that an Advisory Board is to be appointed to assist the Department in the management of the station at Jordan, it is felt that this Board might very properly undertake a similar duty in regard to the local stations. It has, therefore, been decided to turn over to that Board the duties hitherto performed by the Board of Control.

Through the establishment of the Fruit Experiment Stations, valuable data has been ascertained and given to the public regarding the adaptability of the better known varieties of fruits to the various sections of the Province. So far as the future is concerned, it would seem that any further work these stations may undertake must be in conjunction with that performed by the Farm or station at Jordan, which makes it desirable that the one Board should advise in connection with both.

As this will be the last meeting of your Board, I desire to express my warm appreciation of the work performed in the interest of fruit growing in this Province, by those who have served on it in the past.

Yours very truly,

NELSON MONTEITH,
Minister of Agriculture.

Ordered that the Secretary send to the Hon. Nelson Monteith a copy of the following resolution now passed by this Board.

"We the members of the Board of Control of the Ontario Fruit experiment stations, assembled at this our last annual meeting, wish to put ourselves on record as highly appreciating the active interest and valuable assistance given our work by the Ontario Department of Agriculture; and we hope they will continue in the future to bestow the same if not greater attention to this work, which is of constantly increasing importance to the Province."

Ordered that the Secretary include in the Annual Report the following resolutions now passed by this Board:—

MR. DEMPSEY'S RETIREMENT.

"Whereas the Board of Control of the Ontario Fruit Experiment Stations has received and accepted with regret the resignation of Mr. W. H. Dempsey, as experimenter in apples, in Eastern Ontario, this Board hereby records its high appreciation of Mr. Dempsey's valuable services to the fruit growers, not only of his own district but also of all parts of the Province; and desire to express to him our thanks for the self-sacrifice and interest which he has shown in this work during the past ten years."

THE EXPERIMENTERS.

At this, the last meeting of the Board of Control of the Ontario Fruit Stations, the members of the Board desire to place on record their appreciation of the friendly relations which have existed during the past ten years between the experimenters and this Board; and, in retiring, wish the fruit experimenters of the Province of Ontario a long and successful career of usefulness.

FUMIGATION.

In view of the fact that many fruit growers still believe that the fumigation of nursery stock causes more or less injury to it, and hence means a loss to them, be it resolved that it is most desirable that experiments be conducted at the Jordan Harbor experimental farm, in co-operation if necessary with the Dominion Government agents at the borders, to determine definitely if such injury really does occur; these experiments to be conducted with both tree and bush fruits.

BEES AND FRUIT.

Resolved that in view of the apparent evidence shown during the fruit season of 1907 of the importance of honey bees in insuring the pollination of

the blossoms, and the setting of the fruit, we would recommend that systematic experiments be undertaken by the new Advisory Board to determine definitely the value of honey bees in this particular, in order that their usefulness may be brought more prominently under the notice of the fruit growers of the country.

APPLES OF CANADIAN ORIGIN EXHIBITED BY THE CENTRAL EXPERIMENTAL FARM, OTTAWA, AT THE FRUIT, FLOWER AND HONEY SHOW, TORONTO, NOVEMBER, 1907.

By W. T. Macoun, Dominion Horticulturist, Ottawa.

An interesting collection of fruit was exhibited by the Central Experimental Farm, Ottawa, at the Fruit, Flower, and Honey Show held in Toronto, November, 1907. One hundred varieties of apples were shown, most of which were new or little known kinds, including 36 seedling and cross-bred varieties originated at the Central Experimental Farm. There were sixteen kinds of apples shown in baskets. Eight of these were of Canadian origin, and they were grouped together at one end of the table and placarded as such. These attracted much attention as it was interesting to the general public to know that such fine fruit was originated in Canada.

As the report of the Ontario Fruit Experiment Stations reaches a large number of persons interested in fruit it has been thought desirable to publish descriptions of those which were shown in baskets, so that they may be all found in one place. These descriptions have for the most part been made by the writer before but are brought together here for this special purpose.

Perhaps the most noteworthy of all Canadian apples is the *Fameuse*. While some writers have tried to show that this apple is of French origin and was merely introduced from France by the early Canadian settlers, there is no good evidence to support any such contention; and while there is no positive proof that it is Canadian the evidence is very strong that it was originated somewhere along the St. Lawrence river near Montreal or Quebec early in the seventeenth century. The Fameuse and some of its seedlings stand out prominently among the high class dessert apples of their season, and in addition to their beauty and quality they are very profitable, and if an unprejudiced vote were taken by all fruit growers who are well acquainted with apples on what were the two best dessert varieties of their season—which is November to January in Canada—we believe that the vote would be almost unanimous in favor of the Fameuse and the McIntosh, the latter a Canadian seedling of the former. These two apples are always in great demand in Canada, the United States, and Great Britain, and high prices are usually paid for No. 1 fruit.

The following are descriptions of these fruits:

Fameuse (Snow): Origin unknown. Supposed to have been a seeding originated near Montreal or Quebec early in the seventeenth century. Fruit of medium size, roundish to oblate, skin pale yellow, either almost or completely covered with deep red or splashed and washed with red when fruit is not well coloured; dots not prominent; cavity of medium depth and width; stem short to medium in length, slender or moderately stout; basin small, somewhat narrow, almost smooth; flesh very white, very tender, juicy, subacid with fine flavor and a delicate perfume; core small; quality very good to best; season early winter; tree a strong grower, spreading and

a heavy bearer. This is one of the best dessert apples and one of the most profitable where it succeeds well.

McIntosh: Originated with John McIntosh, Dundela, Ont., early in the nineteenth century. Probably a seedling of Fameuse. Fruit above medium to large roundish, slightly angular, highly perfumed; skin pale yellow, almost entirely covered with crimson, dark on sunny side and brighter on rest of fruit; dots few, small, yellow, distinct, but not prominent; cavity of medium depth and width; stem short, stout; basin narrow, almost smooth, medium depth; calyx partly open; flesh white, crisp, very tender, melting, juicy, subacid, sprightly with pleasant aromatic flavour; core of medium size; quality very good to best; season November to January; tree hardy, and a strong, moderately upright grower and an annual and medium bearer. For its season the McIntosh apple is one of the best varieties grown. It is very subject to spot in some places, but this has not been the experience at the Central Experimenal Farm, where the trees are sprayed. It has also not been found to be a shy bearer as reported by some.

In the Province of Ontario and Quebec are many orchards of Fameuse trees, and in the States in which this variety succeeds it is also very popular and has been largely planted. It is only during the last forty years that the McIntosh apple has been propagated, the son of the originator first beginning this work, and other nurserymen eventually doing the same. The oldest McIntosh orchards are in the vicinity of the original tree, which still remains alive although in bad condition. Naturally there was not much fruit available until comparatively recently, and it is only during the past ten or fifteen years that the fruit has become widely known. So great is the popularity of this variety at present that the nurserymen cannot meet the demand for trees. The McIntosh is superior to the Fameuse in several respects. It is larger, more uniformly handsome, and by most people considered of better quality. It is perhaps not quite so productive as Fameuse, but in our experience is a more regular bearer. Like the Fameuse, it is subject to spot, but this can be prevented by thorough spraying.

Another Canadian apple of the Fameuse group which though not quite as useful as the McIntosh is a very profitable sort on account of its handsome appearance, productiveness and good quality, is the Scarlet Pippin, which is described as follows:—

Scarlet Pippin (Leeds Beauty): Originated at Lyn, Leeds Co., Ontario, near Brockville. Fruit of medium size, oblate to roundish; skin yellow, waxy, more or less washed and splashed with bright and dark crimson, and covered with a light bloom; cavity deep and of medium width; stem short, slender; basin narrow, shallow, almost smooth; calyx generally closed; flesh white, firm, crisp, tender, melting, juicy, a mild subacid, with a pleasant but not high flavour; core small; quality very good; season early winter. A very attractive looking apple and said to sell better than Fameuse, which it does not, however, equal in quality. Tree a strong, upright grower, and a heavy bearer.

Baxter (La Rue): The Baxter is a large handsome apple which is growing in popularity every year. It originated with Mr. La Rue, near Brockville, Ont. It does not bear much until the tree has been over ten years planted, but from that time on it bears a medium crop almost annually. The Baxter has not been exported much yet, but it is such an attractive apple in the barrel that it is bound to be popular, and already high prices have been paid for it, in at least one instance it having been quoted higher than

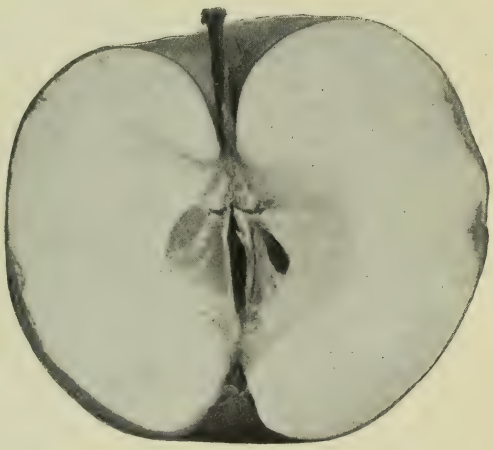
Tompkins' King, to which, however, it is much inferior in quality. It may be described thus:

Fruit very large, roundish; cavity deep, medium width to open; stem short to medium, slender to moderately stout; basin medium depth and width, smooth; calyx open; colour yellow, well splashed and washed with orange red with purplish splashes; dots moderately numerous, large yellow, prominent; skin thick, moderately tough; flesh yellow tinged with pink, coarse, moderately juicy, tender, core small; above medium quality; season December to February.

A very large handsome apple, but too coarse for dessert purposes and not juicy enough.

Oscar: This is a seedling originated at the Central Experimental Farm, Ottawa, and is of Russian origin, the seed having been imported from Riga, Russia. The tree, which is hardy, vigorous, productive, and a moder-

Granby.



Section of Granby.

ately upright grower, fruited for the first time in 1897. The fruit is above medium size, conical, almost oblong, cavity narrow, medium depth, russeted near base, stem medium length, moderately short; basin shallow to medium, medium width, wrinkled; calyx closed; color pale yellow well washed and splashed with bright, attractive, crimson and having a thin pinkish bloom; dots moderately numerous, grey, indistinct; skin moderately thick, moderately tough; flesh white with traces of red, tender, juicy; core above medium size; briskly subacid with little decided flavor; quality above medium; season October and perhaps later. This is a very handsome apple somewhat resembling Chenango. It would sell well, as it is in season just before Wealthy. Being firm it should also ship well.

Granby: The Granby apple is a cross-bred variety, originated at the Central Experimental Farm by Prof. John Craig, the parents being McMahon, female, and Scott Winter, male. The tree is a strong grower and has proved quite hardy so far. Its productiveness has not yet been determined as it has not been fruiting long enough. It is, however, a fairly early bearer. The fruit is medium to above medium in size, oblate to roundish, conic, somewhat angular, cavity narrow, deep russeted; stem short,

moderately stout, basin deep, medium width, wrinkled, calyx small, closed, color yellow, well washed and splashed with attractive orange red; dots obscure; skin moderately thick, moderately tough; flesh dull white, with traces of red, tender, moderately juicy; core medium; briskly subacid with not very decided flavour; quality above medium. Season December to late winter. This variety is much like a large Scott Winter, but not quite so tender in flesh. It is handsome in appearance and may take the place of Scott Winter.

Walter: The Walter apple was originated by P. C. Dempsey, Albury, Ont., and later of Trenton, Ont. It is a cross, the parents of which were Golden Russet, female and Northern Spy, male. The tree is a strong grower and has proved quite hardy at Ottawa. As a top graft it bears heavy crops

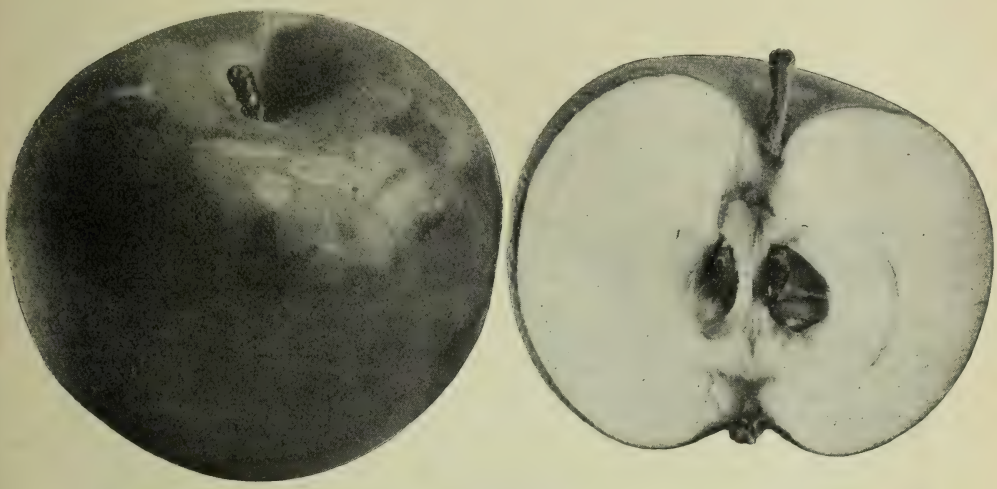
Walter.

Originated by the late P. C. Dempsey, for many years an honored director of the Ontario Fruit Growers' Association, and named after his son Walter H.

in alternate years. Fruit roundish rather irregular; size very large; cavity deep, medium width; stem short, moderately stout; basin deep, medium to open, almost smooth to moderately wrinkled; calyx open; colour greenish yellow, splashed and streaked with red; dots few, small, white distinct; skin moderately thick, moderately tender; flesh yellow, tender, rather coarse, juicy, melting; core small; subacid, pleasant high flavour; quality good to very good. A suggestion of Gravenstein flavour about this apple; season, October.

La Victoire: This variety was introduced by the late Robert Hamilton, Grenville, Que. It originated near Grenville and has been grown at Ottawa for the past nineteen years. It is probably a seedling of Fameuse. Fruit above medium size, oblate, regular; skin greenish yellow, almost covered with crimson; dots fairly numerous, gray, distinct; cavity of medium depth and width, slightly russeted; stem short and stout; basin of medium depth and width, almost smooth; calyx open and medium size; flesh white, tinged

with red, rather coarse, moderately juicy, mildly subacid, with a pleasant flavour; core small; quality good; season, midwinter; tree hardy and a strong, moderately spreading grower. This variety has not, so far, proved very productive, but is a handsome apple, and on account of its season and hardiness will probably prove useful in the north.



La Victoire.

EXPERIMENT STATION EXHIBIT AT CANADIAN NATIONAL EXHIBITION.

By P. W. Hodgetts, Department of Agriculture, Toronto.

In acordance with orders from the Board of Control, an exhibit of fruit was prepared by Mr. T. B. Revett of the Department of Agriculture and myself for the second week of the Show, September 2-7. The same idea as in 1906 was followed, viz., to show as many as possible of the varieties of fruit recommended by the Board for planting in Ontario. Of course, many of these varieties were out of season, but by the use of cherries and the small fruits in preservatives, a fairly complete showing was made. Large placards were conspicuously displayed giving complete lists as outlined in our Bulletin.

The magnificent new building used this year for Horticulture added much to the attractiveness of the display, and it is to be greatly regretted that owing to the very unfavorable season, such a poor showing was made both in fruit and in flowers. As the fruits were two weeks later than usual in ripening, the grapes were particularly poor, being absolutely green and hard. Indeed, the only blue grapes grown outdoors with any color were those shown in the Station exhibit and specially ringed by your Experimenter, Mr. Pettit. Apples, while fairly well colored, were small, showing the effects both of the late season and the summer drought. The other fruits in the general exhibits were fairly good, especially plums.

In procuring these fruits for our Exhibit it was necessary to get the varieties from every source available. Apples were obtained from

Burlington, Trenton, and Collingwood, pears from Grimsby and Trenton, plums and peaches from Winona, St. Catharines, and Grimsby. The bottled fruit was put up by Mr. Sherrington and Mr. Peart mostly in 1906, and had been exhibited at Winnipeg and the Horticultural Exhibition of 1906 in Massey Hall. Most of it was in excellent condition despite the constant handling in moving from place to place. It is to be regretted that all of the varieties of cherries especially were not put up in this form. Something ought to be done also in obtaining and maintaining a full collection of such fruit, as plums, pears and peaches, in as far as it is practicable. The Department of Agriculture is now considering the advertising of Ontario fruit products in various parts of the world, and, to be representative, exhibits should show all these fruits in some form.

Toronto Industrial Exhibition, 1907. Exhibit of Fruit Stations.

Much interest was manifested in the exhibit by all manner of people. Some were merely curious about the fruit, specially those in bottles, but many were anxious for information as to varieties, fungous diseases and insects, care of orchards, etc. The old question of what varieties to plant for either home use or for export trade is yet the all important one, and the placards giving this information as outlined by the Board of Control were constantly referred to. The presence of these varieties in the natural state gave added interest to those seeking such information.

An exhibit of 50 varieties of tomatoes grown by the Horticultural Department at Guelph proved very attractive and should be repeated, and possibly be added to, another year. A few cases of fruit showing proper methods of packing and style of packages were kindly loaned by the St.

Catharines Cold Storage Association as in 1906. Some of the bottled fruits were also contributed by the same Association for the Winnipeg Show and held over for the Industrial. Several plates of apples contributed by Mr. Macoun from the Central Farm orchards were unusually attractive in color and caused considerable comment. These were of two varieties, Lubsk Queen and Livland Raspberry, the former being little known in Canada outside of the Central Experimental Farm.

At the close of the Show, such fruit as was still good was re-packed and shipped together with the bottled specimens to the St. Catharines Horticultural Exhibition which was held the following week. As far as possible a repetition of the Toronto exhibit was made there, many of the varieties being filled in from local sources. The general display at this Exhibition was far in advance of that at Toronto, and it was well worth a trip to the Garden City to see the vegetables and fruit in such perfect form. It is to be regretted that the attendance is, as yet, not as large as the Show deserves.

The varieties on exhibition at Toronto were as follows:—

Apples: Duchess, Gravenstein, Wealthy, Alexander, McIntosh, Fameuse, Blenheim, King, Hubbardston, Greening, Baldwin, Spy, Ontario, Stark, Primate, Wagener, Swazie, Tolman, Mann.

Pears: Clapp, Bartlett, Boussock, Flemish, Howell, Louise, Duchess, Bosc, Clairgeau, Anjou, Keiffer, Sheldon, Lawrence, Josephine, Winter Nelis, Seckel.

Plums: Bradshaw, Imperial Gage, Gueii, Shippers' Pride, Lombard, Quackenboss, Yellow Egg, Grand Duke, Golden Drop, Reine Claude, Abundance, Burbank, Chabot.

Peaches: St. John, Mountain Rose, Early Crawford, Champion, Elberta, Reeves.

Grapes: Moore, Campbell, Worden, Concord, Wilder, Delaware, Lindley, Agawam, Vergennes, Niagara, Diamond, Moyer, Winchell, Champion.

Cherries: Knight, Napoleon, Montmorency, Elkhorn, Richmond.

Strawberries: Warfield, Saunders, Bederwood, Dunlap, Lovett.

Currants: Cherry, Fay, Prince Albert, Wilder, White Grape.

Raspberries: Columbian, Marlboro, Cuthbert, Golden Queen.

Gooseberries: Pearl, Downing, Whitesmith, Red Jacket.

REPORT OF THE INSPECTOR OF FRUIT EXPERIMENT STATIONS.

Prof. H. L. Hutt, Ontario Agricultural College, Guelph.

The work of variety testing has been continued at the various Fruit Experiment Stations throughout the Province the same as in previous years. I have inspected each of the Stations during the year, and shall briefly refer to the work in progress at each.

At the southwestern station in Essex County, Mr. J. L. Hilborn has set out for experimental purposes a varied collection of fruits, among which there was a good assortment of varieties of peaches and plums. The season was somewhat unfavorable for newly planted stock because of the cold, late spring and drought during the later part of the summer. However, most of the stock has lived and done fairly well. The failures Mr. Hilborn attributes to weakened vitality from fumigation.

Since the severe winter of 1903 and 1904, when most of the peach orchards were destroyed, fruit growers of this district have been giving more attention to the growing of vegetable crops, such as melons and tomatoes, and forcing house crops of tomatoes, lettuce and cucumbers. The crop of tree fruits was almost a total failure in this district his year. Mr. Hilborn has been appointed manager of the Erie Fruit Company Co-operative Association, and is in close touch with the fruit and vegetable interests of the district, and is determined to do all he can to make the Experiment Station work of value to that section of the country.

Mr. E. E. Adams, also of Leamington, has been giving his attention principally to the testing of vegetable crops, and will be able to report this year upon experiments conducted with melons, tomatoes, potatoes, peppers and other forcing house crops. The unseasonable late frosts destroyed the early set plants of tomatoes and more or less affected the crop throughout the season. Nevertheless, Mr. Adams will be able to report upon experiments which will be of value for his district.

At the Wentworth Station, Mr. Murray Pettit, Winona, has tested a large collection of grapes, and has pretty thoroughly settled the question as to the leading varieties at the present time for his district. However, it will be necessary to test the new varieties from time to time as they come out, and these should be introduced and tested in comparison with the standard varieties as soon as they make their appearance. He has also good representative collections of varieties of pears, plums, and peaches, from which he is able to judge of the leading varieties of these under his conditions of soil and climate.

At the Maplehurst Station, Mr. Woolverton, Grimsby, has a large collection of varieties of all the leading kinds of fruits, and is in a position to give some valuable information regarding varieties of cherries, plums, pears, and peaches. The crop on most of these this year was light, cherries being almost a complete failure. He will be able, however, to give some valuable notes upon peaches, of which he has a large number under test. The marked difference in the light sandy loam at Mr. Woolverton's, and the heavy clay loam in Mr. Pettit's orchards, should furnish a good opportunity for the comparison of varieties under different soil conditions. The adaptability of varieties to certain localities has been well worked out by our Fruit Experiment Stations. The adaptabiltiy of the leading varieties to the various soils is one that might yet be worked out in the same way.

Mr. A. W. Peart, at the Burlington Station, made a specialty at first of blackberries and currants. This part of the work he has conducted to a finish and is not now growing either of these fruits extensively. He has, however, extensive plantations of a number of other fruits upon which he can furnish valuable reports. His vineyard contains a large number of varieties, and because it is considerably north of the Niagara District where the bulk of the Ontario crop is grown, his reports on varieties would be of value to a wide area where grapes are grown in a more limited scale. He has also a young experimental pear orchard coming into bearing, and two good apple orchards in full bearing. In one of these are about thirty varieties of Southern apples introduced by grafting into bearing trees. These are now beginning to bear and should furnish interesting data for Mr. Peart's reports.

Mr. E. B. Stevenson, our strawberry expert, has retired from the ministry, in which he was engaged, and has settled permanently at his old home in Guelph. He is now giving most of his time to the growing and testing of strawberries. His plantations are well worthy of a visit by anyone interested in this fruit, for they contain not only all the best standard varieties, but all of the newest and latest introductions. His repu-

tation as a specialist on strawberries has put him in touch with similar specialists all over the continent, and he is usually favored with plants for trial of every new variety as it is introduced. His reports are worth to the public many times what our Board pays for them, and they are freely quoted in nurserymen's catalogues.

At the Lake Huron Station, Mr. A. E. Sherrington, Walkerton, has an extensive collection of varieties of the fruits which can be grown in his part of the country. He has conducted for several years reliable tests with raspberries, gooseberries, and plums, and is putting out commercial plantations of the leading varieties of these. His young orchard of apples and pears is just nicely coming into bearing, and will in time furnish valuable information regarding the varieties best adapted to that section of the country. His bearing apple orchard is made up of the varieties usually grown in commercial orchards of that district, and is a profitable one.

At the Georgian Bay Station, Mr. John G. Mitchell's plum orchard at Clarksburg has suffered severely from the severe winters of late, the older orchard being nearly all killed out. In the young orchard, however, there are a large number of varieties which have not yet been fully tested. Many of these Mr. Mitchell should be able to report upon this year. He is now manager of one of the largest co-operative associations in the Province, and his time is so largely taken up with that work that he would be glad to be relieved of the Fruit Experiment Station work.

The Simcoe Station, in charge of Mr. G. C. Caston, Craighurst, has extensive collections of varieties of the various kinds of fruits most likely to succeed in that district. Mr. Caston has had a long and varied experience in testing of hardy varieties, and the result he has obtained are of great value to intending planters in his section. Of late years many of the varieties formerly supposed to be hardy have succumbed to severe winters, and the list of varieties formerly recommended for that section will have to be more or less revised as a result of further testing.

At the Bay of Quinte Station, Mr. W. H. Dempsey, Trenton, has one of the largest collections of varieties of apples in the Province. Many of these have been added from time to time by grafting on to bearing trees, and these Mr. Dempsey has been reporting upon. His large commercial orchard, however, affords ample opportunity for selection of varieties best adapted for commercial as well as domestic planting in that section. Mr. Dempsey is now manager of one of the large co-operative shipping associations for his district, and he is in a position to give valuable information regarding commercial handling of apples for the Old Country market.

At the St. Lawrence Station, Mr. Harold Jones' orchard at Maitland, has suffered more or less from the severe winters during the past couple of years. The old orchard which was at its prime when the experimental work was begun now begins to show the effects of severe winters, and the bearing of heavy crops of fruit. The young experimental orchard is just nicely coming into bearing, and from it Mr. Jones expects to get some valuable information regarding varieties suited to his soil and locality. He has put out a new commercial apple orchard, using the McMahon White as a hardy stock upon which he is top-working Fameuse with scions from the best tree in his old orchard. This careful selection of scions should give him a uniform lot of fruit of the best type.

The conditions at this station are so different from those at Ottawa, nearly one hundred miles away, that Mr. Jones feels certain that the results of experiments at Ottawa will never as fully meet the requirements of his district at tests conducted in it, and he is desirous as far as lies in his power of carrying on to a finish the work he has begun.

Probably the station from which information has been most keenly sought by the largest number of people has been that in the Northern District. The settlers in New Ontario, north and west, are particularly anxious to know what will be most likely to succeed with them. Mr. Charles Young, our experimenter at Richard's Landing, Algoma, has had under test for a number of years a large number of varieties of fruits most likely to succeed in that northern section. For a number of years it appeared from his tests that it was possible to grow a great many more kinds of fruits in that northern district than was commonly supposed; but the severe winters during the last couple of years has severely tested the hardiness of most kinds of fruits, and many of the varieties which did well for a number of years have succumbed at last to winter killing.

One feature of orchard management which has shown itself necessary for the north is the growing of low-headed trees which are not so liable to injury from sun scald.

I did not visit the experimenters in the Temiscaming District to whom stock has been sent for testing, as it is too soon yet to look for results from it. As soon as the new pioneer farm in that district has been cleared of forest and is ready for planting, we should have a good collection of fruit of the hardiest kinds sent there for testing, as probably the greatest demand at the present time is for information regarding varieties most likely to succeed in the new districts of Ontario which are now being opened up.

In closing this report, I wish to call attention to some of the conditions which have materially affected the fruit crop of the Province during the past season.

In the first place, the weather has been exceptional. The winter was not severe and fruit trees as a rule wintered well. Bloom was abundant, but during the time the trees were in bloom the weather was cold and windy and very unfavorable for the working of bees, which are the most active agents in the pollination of the blossoms. In fact, there were only two bright warm days, and these several days apart, during the whole season of bloom that the bees worked at all freely. Mr. Murray Pettit informed me that he noticed two distinct settings of the fruit on his cherry trees which he believed corresponded to the two good days the bees had for pollination.

In the second place, there was an unusual scarcity of honey bees this year to do all the pollination necessary to the setting of a full crop of fruit. I was informed by a leading beekeeper that not more than twenty per cent. of the honey bees of the Province were wintered successfully last winter. This being the case, it is easy to understand the effect that a scarcity of bees with unfavorable weather for their work had in giving a light crop of fruit. I have noted repeatedly in various parts of the Province that some of the most productive orchards have been those in which honey bees are kept, and there is no question in my mind that it would pay fruit growers well to keep a few hives of bees merely for the purpose of insuring fertilization of fruit blossoms. In sections where fruit farms are close together as they are in the Niagara District, the growers within a radius of one or two miles might co-operate and employ a competent beekeeper to look after a good size apiary.

REPORTS FROM THE FRUIT EXPERIMENT STATIONS* FOR THE YEAR 1907.

SOUTHWESTERN FRUIT EXPERIMENT STATION.

By J. L. Hilborn, Leamington, Ont.

I presume it is already quite generally known that this locality has suffered another reverse in its peach industry, by the severe frost which occurred early in October, 1906. At most points in the Province considerable snow fell at this time, which had the effect of affording considerable protection to the trees from the frost, although it destroyed many by its weight. In the Leamington District very little snow fell, and the frost was therefore more severe.

Mr. J. L. Hilborn's 20 acre peach orchard. Two year old trees.

Peach trees under three years old, as a rule do not ripen their wood as early as older trees, and it was this class of trees that suffered. Trees that were old enough to bear, and also young trees that were cultivated but little, and were therefore well ripened at the time of the frost, sustained but little loss, while hundreds of young trees that were not well ripened were killed outright. The seriously damaged portion of the trees, in almost every case that came under my notice, was about midway between the fork and the base of the tree, the bark being completely killed for several inches at that point.

I might state here that the greater portion of the peach district in Western Michigan suffered much worse than we did, as many thousand acres of peach trees and Japan plum trees were reported as being killed outright. The northern part of the peach district there received quite a fall of snow at this time and therefore escaped severe injury from the frost, and the orchards in that vicinity produced a heavy crop this season.

What peach orchards we have in this district are as a rule making a satisfactory growth, and a few orchards are being planted each year, but planting is not very general.

Note by Secretary: In editing the reports in this volume I have given each one complete in itself, instead of separating its parts under the various fruit heads, which was done previously for the convenience of the reader. My object is to show more clearly the work of each station. I am adding a complete index to serve the purpose attained without it in the previous reports.

I have but little to report this season, as far as the fruit crop is concerned. Fruit trees of nearly all varieties produced but a light bloom, and shortly after the peaches, plums and cherries were set, we had a severe frost, to which I attribute the failure of our crop. The failure was so complete that but few had fruit enough for their own use, even among the leading growers. Plums were also a complete failure, and cherries very light, perhaps ten per ceit. of an average crop. Pears and apples are also very scarce. It was the most complete failure of fruit that I have ever experienced.

For the past few years growers here have been plowing up their berry plantations, largely on account of the difficulty experienced in obtaining satisfactory assistance for growing and harvesting, and the acreage grown here now is very limited. Those who had plantations received a fairly good crop, with the exception of blackberries, which were light.

Very few grapes are grown here since the vines were destroyed by roots freezing in 1899. Those who have vines growing received this season a good crop, except in some locations near the lake, where the rose beetle completely destroyed every bunch. This has been the case in my own vineyard for several years.

I planted last spring for experimental purposes,—Strawberries, 7 varieties; raspberries, 14 varieties; blackberries, 5 varieties; currants, 8 varieties; plums, 18 varieties; peaches, 36 varieties; and a few other fruits. The small fruits have mostly made an excellent growth, and the plum trees have also nearly all grown well, but very many of the peach trees failed. This I expected at planting time, as the trees were in very bad condition, having been killed either by frost last fall or by severe fumigation.

I was very much disappointed at not having a good stand of peach trees for experimental purposes, as I consider the experiments with this fruit to be of much more value for this district than all the others combined, and shall certainly put forth my best endeavors to secure a good stand next season. I have however secured a good growth on some choice, new varieties obtained from Michigan, and hope to procure something valuable from them for experimental purposes.

What peach orchards I have remaining, as well as others in this vicinity, have apparently ripened up in good shape, and appear to be in excellent condition to bear a crop next season. Last season the San José scale made its appearance more or less on almost every farm in this district, and multiplied very rapidly. Spraying with lime and sulphur was very generally adopted last spring, and apparently destroyed nearly all the scale. Part of the orchards on my own place became badly infested last year before I was aware of its presence, and the one spraying with lime and sulphur, thoroughly applied, last spring, has apparently almost completely cleared it out. I have found but very few live scale this season.

Since the destruction of peach orchards in this vicinity several years ago, fruit growers have been turning their attention more and more to the production of certain classes of early vegetables. The writer was first to take up the different branches of this industry but the followers are now legion. Present appearances indicate that the production is increasing too rapidly for the available market. A number of us this season formed a co-operative association and packed our output at a central packing house, and sold under one head about fifty carloads of vegetables, consisting of tomatoes, muskmelons, cucumbers, early cabbage, sweet corn, peppers, etc. We found many advantages in this method of handling our crop, while it has also some disadvantages. This having been a very unfavorable season, it requires another year's test to decide its value.

I have been growing some vegetables under glass for two seasons and the crop this year was very satisfactory and good prices obtained. The house used for this purpose is forty by one hundred feet, and was planted late in March with tomatoes and cucumbers, both of which did well. Last season I grew quite a number of varieties of tomatoes, of which Dreer's "Best of All" and "Frogmore" did the best. This season I grew "Chalk's Jewel" "Best of All" and "Frogmore," and the varieties did best in order named. Varieties of cucumbers tested were "Satisfaction" and "Arlington," both of which were very satisfactory. A few plants of a long English variety, "Carter's Perfection" also did very well.

MAPLEHURST FRUIT EXPERIMENT STATION.

By Linus Woolverton, Grimsby.

Cherries.

The Season. The season has been an unfavorable one for all fruits in the Niagara District, except perhaps for apples and grapes. Peaches and plums set heavily, but have been dropping all through June and July, until now the prospect is for a small crop. The cherries bloomed very freely, but did not set well, and of those which did form a large number blighted and dropped.

Professor Hutt of the Agricultural College, Guelph, on his visit in July stated that his observations led him to attribute the dropping of the fruit to imperfect fertilization. The great scarcity of bees might explain the whole mystery, for to these agents the fruit grower is far more deeply indebted than he is aware. The many small, imperfect fruits, without seeds, tend to confirm this view, and to make us believe that fruit growers should keep bees, which will enrich them in two ways, first, by their honey and, secondly, by increasing the yield of their fruit crops.

Fungi.

The *Black Knot* of the cherry, which had not been seen in my cherry orchard for many years, was much in evidence this spring. The Montmorency and the English Morello were especially attacked, while the Dukes also showed it considerably. Having noticed in the April pruning the small black knots, which grew unobserved among the leaves last season, I at once gave them my attention, and went over my whole orchard, cutting out and burning up every knot I could find; for if left neglected, it is surprising how quickly they ruin an orchard.

The Cherry Rot was again very troublesome. Knight's Early was almost free, Governor Wood was very little affected,Tartarians were somewhat subject, but Windsor, Elkhorn, Napoleon, and even some of the Kentish Pies, were nearly worthless.

The *Time of Ripening* of the various kinds was unusually late, no variety being ready before July. Governor Wood, which in 1905 was harvested between the 22nd and the 27th of June, and even earlier in 1906, was harvested this season during the first week in July. The Montmorency which was harvested about the 10th of July, in 1906, was harvested about the 20th in 1907.

This we may say of all varieties, that they ripened this season from seven to ten days later than in ordinary seasons and the dates for each variety ripening this season would not be a fair criterion for average years.

CHERRIES.—SHOWING TRUE CHARACTERISTICS DURING TEN YEARS' GROWTH ON MAPLEHURST FRUIT FARM AT GRIMSBY, ONTARIO.

Variety.	Season.	Class.	Habit.	Vigor.	Hardiness.	Productiveness.	Value.
Abbesse	Mid. July	Morello...	Round h'd	8	7	4	4th rate.
Bruseler Braune	Early Aug.	" ...	"	8	8	5	3rd "
Bessarabian	.....	.....	.....	8	9	5	3rd "
Belle Magnifique	Mid. July	Duke.....	.....	6	.....	.....	3rd "
California Advance	Early July	"	Upright ..	8	6	7	1st "
Cleveland	Mid. June	Heart	Spreading.	8	5	8	1st "
Choisy	Early July	Duke.....	Upright ..	6	4	4	3rd "
Coe	July	Heart	Spreading.	10	6	6	2nd "
Connecticut Black Heart	.....	"	"	7	5	.....	.....
Dykeman	.....	Bigarreau.	"	7	.....	.....	.....
Dyehouse	Mid. June	Pie.....	Round....	6	8	9	1st rate.
Eagle	Mid. July	Heart	Pyramidal	9	5	4	3rd "
Early la Maurie	.....	.....	Upright ..	10	.....	.....	.....
Early Purple	Early June	Heart	Pyramidal	10	5	5	3rd rate.
Early Richmond	Mid. June	Pie.....	Round....	5	8	8	1st "
Elkhorn	Mid. July	Bigarreau.	Pyramidal	9	5	10	1st "
Elton	End June	Heart	"	10	5	9	2nd "
Empress Eugenie	"	Duke.....	Upright ..	8	5	6	3rd "
English Morello	Mid. July	Morello...	Round....	5	8	10	1st "
Governor Wood	Mid. June	Heart	Spreading.	8	5	8	1st "
Grenner Glas	Mid. July	.....	Upright...	8	.....	.....	.....
Griotte du Nord	.....	Morello...	Round....	6	8	6	.....
Hortense	Early July	Duke.....	Spreading.	9	5	6	2nd rate.
Ida	End June	Sweet	Upright ..	7	.....	5	3rd "
King's Amarelle	.....	Pie.....	Round....	9	.....	.....	.....
Knight	End June	Heart	Spreading.	10	6	9	1st rate.
Kosloo	End July..	Morello...	Bush	2	9	4	4th "
Late Duke	Early July	Duke.....	Upright ..	9	6	7	1st "
Lutovka	Mid. July	Morello...	" ..	7	.....	.....	.....
Love Apple	.....	.....	Spreading.	6	.....	.....	.....
Litham	Mid. July	.....	.....	8	7	6	.....
May Duke	Mid. June	Duke.....	Upright ..	9	6	8	1st rate.
Mezel	Mid. July	Bigarreau.	Pyramidal	10	6	7	2nd "
Montmorency	Early July	Pie.....	Round....	7	7	9	1st "
Mazzard	"	Heart	Pyramidal	10	6	7	3rd to 4th.
Montmorency Ordinaire	"	Pie.....	Round....	7	7	9	1st rate.
Napoleon	"	Bigarreau.	Spreading.	8	6	10	1st "
Olivet	End June	Duke.....	Round....	6	5	5	3rd "
Orel	Mid. July	Pie.....	"	5	10	8	1st "
Ostheim	"	Morello...	Slender...	5	8	4	4th "
Purity (probably Dyehouse)	End June	Pie.....	Round....	6	7	9	1st "
Phillippe	.....	.....	.....	.....	.....	.....	4th "
Red May	.....	.....	Upright ..	6	.....	.....	4th "
Rockport	End June	Bigarreau.	Spreading.	7	5	9	3rd "
Royal Duke	"	Duke.....	Upright ..	9	6	9	1st "
Russian 207	Mid. July	"	" ..	8	8	8	1st "
Schmidt's Bigarreau	Early July	Bigarreau.	Spreading.	10	.....	3	4th "
Schatten Amarelle (or Shadow Amarelle)	Mid. July	Morello...	Slender...	6	.....	4	4th "
Spate Amarelle	.....	" ...	Round....	5	.....	.....	.....
Strauss Weichsel	End June	.....	.....	7	.....	.....	.....
Suda Hardy	Early July	Morello...	Round....	7	.....	6	3rd rate.
Tartarian	"	Heart	Pyramidal	9	4	7	1st "
Vladimir	Mid. July	Morello...	Slender...	5	8	4	4th "
Windsor	Mid. to end July ...	Bigarreau.	Spreading.	10	7	8	1st "
Wragg	Mid. July	Morello...	Round....	5	8	10	1st "
Yellow Spanish	Early July	Bigarreau.	Spreading.	10	5	5	1st "

ABESSE: Pielo; no crop; tree unproductive; of no value.

BRUSELER BRAUNE: Morello; no crop.

CHOISY: Duke; tree lacks vigor, bore small crop, cherries scattered over the tree, single, not productive enough to be of any value for market; fruit very delicious, almost honey sweet, well worthy of a place in the home garden as a dessert fruit; of no value for cooking.

CLEVELAND: Heart; no crop; fruit resembles Wood, and about the same season.

COE: Heart; no crop; tree productive; fruit too tender for the commercial orchard.

DOWNER: A very small crop; tree not productive.

DYEHOUSE: Kentish Pie; ripened early in July, first before Richmond; not quite so productive as in 1906; seems to keep up its reputation as a commercial kind.

Experimental cherry orchard of L. Woolverton, Grimsby, Ont. Eighty varieties under test.

EAGLE: Heart; no crop; just a few stray cherries; should not be recommended, except for the garden of the amateur.

ELTON: Bigarreau; a small crop, so subject to rot that no fruit was harvested; too soft to be valuable as a commercial variety.

EUGENIE: Duke; no crop; tree not very productive.

HORTENSE: Duke; trees showing lack of vitality; not productive this season. This cherry is the largest and finest of the Dukes, but the tree has not kept up its productiveness. One or two seasons it excelled every variety of Duke, and I was inclined to recommend it very highly for the commercial orchard, but now I am disposed to place it only in the domestic list.

KNIGHT: Heart; tree wonderfully vigorous; one tree at Maplehurst is fifty years old, and still as healthy as ever; very vigorous, reaches a height of over thirty feet, a magnificent tree; very productive; yielded over 100

quarts this unfavorable season. Fruit, reddish black, large, excellent, not subject to rot or curculio. This variety has always given me satisfaction.

Late Duke: Tree vigorous, and very productive, even this unfavorable season; bears fruit in clusters which are easily and rapidly gathered. The fruit is semi-acid, not much subject to rot, and very desirable for pies and sauce.

May Duke: Duke; the trees still vigorous and healthy, after about ten years' growth from planting: fruit ripened early in July, and very desirable for cooking; smaller than Late Duke.

Mezel: Duke; tree very vigorous, about thirty years of age, but not as productive as formerly; fruit not equal to Tartarian, being rather too firm and lacking in quality. At one time I esteemed this variety very highly for the commercial orchard, but it has not given me as much satisfaction for several years past, and therefore I wish to modify my statements regarding its value.

Montmorency: Kentish Pie; tree vigorous and productive, but not as productive as in other seasons; requires plenty of sun to be productive, trees in partial shade, or too closely planted, give very small crops; fruit very free from curculio, not subject to rot unless left hanging too long on the trees Although grown so widely over the Province, this variety is still one of the best for market purposes.

Morello: Trees very productive but not as healthy nor as vigorous as the Montmorency; fruit inferior in flavor to Montmorency, but a very salable cooking cherry, and being later than the latter variety it is recommended for the commercial orchard, because it prolongs the shipping season.

Napoleon: Bigarreau; tree vigorous, ordinarily one of the most productive of varieties, but the trees in the experimental plot have been somewhat disappointing in this regard: Fruit so large and fine as to command the highest price but often very subject to rot. I would advise planting this variety sparingly in the commercial orchard.

Orel: Kentish Pie; ripens about with Richmond; very hardy.

Purity: Kentish Pie; probably identical with Dyehouse.

Russian 207: Maintains its character as given in 1905, for value and productiveness.

Schmidt's: No crop.

Spanish: Bigarreau; a magnificent grower; one tree about fifty years planted is over thirty feet high and spreads like an apple tree, a scanty bearer, but the size of the fruit makes every cherry count in filling the basket; fruit the finest and largest of the Bigarreaus and commands the highest market price. I do not advise planting this cherry extensively for market.

Windsor: Bigarreau; tree very vigorous, probably the strongest grower of all the kinds in my collection, requires severe cutting back or the tree would grow out of all bounds, and the fruit could not be harvested, needs also severe thinning out of the branches to give access to the sun's rays: fruit very large and fine when fully ripe, but often harvested before it has reached its attractive dark red color for fear of losing the crop with rot to which it is very subject; crop this year very small, and much subject to rot. I am much disappointed in this variety, having two hundred trees of bearing age.

PEACHES.—SHOWING TREE CHARACTERISTICS DURING TEN YEAR'S TEST ON MAPLEHURST FRUIT FARM AT GRIMSBY.

Variety.	Origin.	Season.	Vigor.	Hardiness.	Productiveness.	Value.
Alexander	Ill.	End July	8	8	10	2nd rate.
Barnard	"	Early Sept.	8	9	10	1st "
Beer's Smock	N. J.	Early Oct.	9	9	8	1st "
Brigden		Mid Aug.	8	8	8	1st "
Crosby	Mass	Mid Sept.	9	10	10	1st "
Champion	Ill.	Early Sept.	9	9	9	1st "
Elberta	Ga.	Mid. Sept.	10	9	10	1st "
Early Rivers	Eng.	Early Aug.	9	9	10	2nd "
Early Crawford	N. J.	Mid Aug.	10	7	7	1st "
Early Michigan	Mich.	"	7	8	8	2nd "
Fitzgerald	Ont.	"	8	8	7	1st "
Foster		End Aug.	7	8	6	1st "
Garfield	U. S.	Mid Aug.	7	8	7	1st "
Golden Drop	Mich.	End Sept.	8	9	9	2nd "
Greensboro		Early Aug.	9	9	8	2nd "
Hales	Ohio.	Mid Aug.	9	9	9	2nd "
Hill's Chili	N. Y.	Mid Sept.	7	9	8	2nd "
Jacques Rareripe	Mass.	"	8	8	7	1st "
Kalamazoo	Mich.	End Sept.	8	8	8	2nd "
Late Crawford	N. J.	"	9	8	7	2nd "
Longhurst	Ont.	Mid to end Sept.	8	10	10	1st "
Lewis	Mich.	End Aug.	9	9	8	1st "
Lorentz		Mid Oct.	7	7	5	2nd "
Mountain Rose	N. J.	End Aug.	8	8	8	1st "
New Prolific	Mich.	Early Sept.	9	10	10	1st "
Old Mixon	U. S.	End Aug.	10	7	5	2nd "
Reeves		Early Sept.	10	7	7	1st "
Smock	N. J.	Early Oct.	7	8	8	1st "
St. John		Mid Aug.	10	9	8	1st "
Stephen's Rareripe		End Sept.	9	8	8	1st "
Salway	Eng.	Mid Oct.	8	8	7	2nd "
Triumph	Mich.	Early Aug.	8	8	8	2nd "
Wager	N. Y.	Early Sept.	8	8	7	2nd "
Wonderful		End Sept.	10	7	4	2nd "
Wheatland	N. Y.	End Aug.	9	8	5	2nd "

BEER'S SMOCK: No fruit this year; a good crop in 1906, which ripened a little in advance of Smock, and averaged larger in size.

CHAMPION: In season early in September, with the last St. Johns; a very productive tree, and the fruit is a beautiful white flesh peach of excellent quality; one of the best, especially for the home garden.

CROSBY: In season toward end of September, just after the early Crawford; the tree is vigorous and productive, and the fruit a good shipper.

EARLY CRAWFORD: A general failure this season (1907), and what fruit was produced was much smaller than usual on account of the dry summer. Our best peach, but the fruit buds seem a little tender.

ELBERTA: Gaining in popularity; tree healthy, showing little if any curl leaf; yield heavy, and fruit large and well colored; sold at top prices.

FITZGERALD: Very similar to Early Crawford; possibly a little hardier in fruit bud; a fair crop, but smaller than usual.

FOSTER: A moderate yield of fine sample; especially desirable for home use.

Greensboro: Ripened about with Alexander, but more even in size, and ripened more fully so that it is more desirable for home uses; too tender for distant shipments.

Mountain Rose: A fair crop, and delicious for home uses.

New Prolific: Ripened early in September, and has borne a fuller crop than Early Crawford for two or three years past; a profitable kind.

Old Mixon: An excellent white flesh peach, but inclined to drop early; it follows the Early Crawford very closely, indeed it cometimes drops badly before the Crawfords are finished.

Rivers: I had planted this variety very freely, but found the fruit too tender for shipment, and therefore I have taken out nearly all the trees in the commercial orchard.

Smock: Too late in ripening to sell well this season; a light crop; often quite profitable.

Sneed: A fine yield this season, and the fruit was even sized and well colored; harvested between 20th and end of July, the very earliest peach we have, and valuable on that account.

Triumph: A moderate crop, of fair sized fruit; sold at a fair price for canning whole; twigs subject to blight.

View in M. Pettit's Vineyard, Winona. Grape rows half a mile long.

WENTWORTH FRUIT EXPERIMENT STATION.

By M. Pettit, Winona, Ont.

Grapes.

The cold weather during May and June did not prevent grapes from fertilizing better than they have for many years. The Massassoit, Moyer, Lindley, and other imperfect fertilizers were nearly perfect in bunch; nearly all of the discarded varieties bore better crops than ever before.

There was no grape rot nor scarcely any mildew, consequently our experiments in spraying did not give results. All varieties grown at this station have been fully described in previous reports and further description seems useless. This season again confirms the list of varieties previously recommended for planting for profit in the Niagara District, namely, in order of ripening:—Champion, Campbell, Worden, Delaware, Lindley, Moore's Diamond, Niagara, Concord, Agawam, Catawba, Rogers No. 4, No. 44 and No. 28; Vergennes also might be profitably added to the list on some soils and locations. Champion should only be planted where grapes ripen very early.

Campbell's Early, which has been recommended highly in previous reports, has shown a tendency to winterkill.

Catawba should only be planted on heavy soil where grapes ripen early. They should also be pruned close to prevent overloading and late ripening.

Plums.

Lombard yielded a greater profit per tree than any other variety this season, followed with Bradshaw and Monarch.

General Hand, Washington, Coe's Golden, Yellow Egg and many other fancy varieties were a failure. With my experience, General Hand and Washington should both be struck off any list for profit. Reine Claude is the most profitable light colored plum to plant; it is productive, good quality, long keeper and sells higher than any other.

Most of the Japans were a failure. Many of them are of no value and should not be planted, such as Carden, Ogon, Wickson, and many others. Burbank and Abundance are of some value, but should not be planted too largely.

Pears.

Pear blight has not been as destructive the past summer as it has been for the last three seasons. Duchess, Anjou, and Kieffer have suffered the least.

Duchess Dwarf is the only pear that I would recommend planting for profit in this locality, while the blight continues as destructive as it has been for the past few seasons. It bears young and continues to bear good regular crops. Three hundred trees planted at this station in 1880 are healthy and bearing good crops.

Bessarabian was again this season the most profitable cherry at this station and Elberta the most profitable peach.

BURLINGTON FRUIT EXPERIMENT STATION

By A. W. Peart, Burlington.

General Notes.

Upon the whole, the fruit crop was rather a satisfactory one. While the quantity may have been less than normal, the general quality was good, and prices ruled considerably higher than for some years.

While the fluctuating winter temperatures practically eliminated some fruits, and the cold, backward spring retarded vegetation, still the fine, long,

open fall, gave opportunities for garnering the crop without waste. Fruit trees and plants are also going into winter quarters with firm and well-matured tissue, as there has been but little growth since the middle of August.

Apples were a fair crop of perhaps normal quality. A large percentage was injured by the codling moth, which was never so destructive. There was little or no spot, however, and the caterpillar and canker worm were practically absent. The apple maggot did some damage—a comparatively new enemy, which will require further investigation.

Commercial List: Astrachan, Duchess, Wealthy, Ribston, Blenheim, King, Greening, Baldwin and Spy.

Pears were a moderate crop of excellent quality. Anjou and Kieffer were perhaps the shyest. There was practically no spot nor scab.

Commercial List: Wilder, Clapp, Bartlett, Boussock, Louise, Duchess, Anjou, Kieffer, Winter Nelis.

Plums were a good crop. Among the Japan varieties, Satsuma and Burbank fruit buds appear to be less resistant to hardships than many of the other kinds. The same seems also to be true with Glass Seedling and Reine Claude of the domestic class. Plum rot was not very general, neither did the curculio do much damage, although the fall web worm was quite plentiful.

Commercial List: European: Bradshaw, Niagara, Imperial Gage, Lombard, Yellow Egg, Glass, Reine Claude, Staunton. Japan: Red June, Abundance, Burbank, Chabot and Satsuma.

Peaches: Outside of the Crawford, Crosby, Longhurst and Elberta, there were very few peaches, and these only in sheltered situations.

Commercial List: Sneed, Alexander, St. John, Early Crawford, Champion, Elberta and Smock.

Grapes were the best crop ever grown here. The quality was also good, mildew being very rare. The season was about a week later than the normal so that in some locations the ripening of some varieties was scarcely completed. Most of the crop was, however, gathered without waste before the severe frosts.

Commercial List: Black, Moore's Early Worden, Concord; Red, Delaware, Massassoit, Lindley, Vergennes; White, Niagara, Diamond.

Cherries: Sour and sub-acid cherries were a fine crop. The Windsor, Montmorency, and Morello, were eminently good. There was little rot, and timely spraying also checked the codling worm. Cherries appear to flourish best on high, well drained, sharp, gravely soils.

Commercial List: May Duke, Early Richmond, Windsor, Montmorency, and English Morello.

Blackberries were not a heavy crop. The drought at ripening time materially decreased the marketable fruit, particularly in plantations not well pruned nor carefully cultivated. Price 9 to 10c. per quart at Burlington. (f.o.b.). For commercial list see notes on blackberries found elsewhere in this report.

Raspberries were a light crop. The canes were severely injured by the winter, the Cuthbert especially, although the Marlboro did not escape. The grub also injured some plantations. Price here 10c per quart.

Commercial List: Marlboro, Herbert and Cuthbert (red varieties).

Gooseberries were a good crop, price here 65c. per eleven quart basket.

Commercial List: Pearl, Downing and Red Jacket.

Currants were a fair crop, prices here were 65c. for reds, and $1.00 for black, per eleven quart basket. For commercial list see notes on currants.

Strawberries were only a moderate crop. Those patches not protected during the winter were materially injured. Prices here were 6c. to 7c. per quart.

Commercial List: Leader, Senator Dunlap, Williams.

Apples.

Twenty-five varieties of Southern State apples bore fruit last year and were fully described in station report. Other varieties of the same class fruited this season for the first time as follows:—

Black Ben Davis: Medium size; long stem; roundish conical; cavity and basin medium; color dark red; shaded with yellow; quality poor; flavor acid; season winter; yield 3 apples.

Carter's Blue: Small fruit; medium cavity and basin; long stem; color bluish, brown and green; season winter; yield 2 quarts.

Swaar: Medium to large apple; yellow with slight crimson flush; skin rough and dotted; form roundish flat; slightly ribbed; stem medium length; basin and cavity medium; rich, pleasant sub-acid flavor; season, mid-winter; yield ¾ bushel.

Milam, Minnesota Pippin, Red Limbertwig, Bonum, Gill's Beauty, Carter's Blue, and L. S. Pearmain are very inferior specimens of apples.

Efforts were made to reduce the ravages of the Codling moth. Apple trees to the number of 200 were banded in late June with burlap or coarse sacking. They were removed three times—in July, August and September—and the worms (pupæ) destroyed. The bands would average about 17 worms each time, or 51 per tree, or about 10,000 in all, during the growing season. The crop of apples was light—only some 300 barrels—of which over one-half graded for export. Had it not been for the bands, probably only a small portion of the above quantity would have been shipped, for the moth was destructive beyond all precedent.

The great point with bands is to attend to them, otherwise they aggravate the trouble. Hogs were also kept in the orchards, thus still further eliminating the worms.

Pears.

The French pears planted in 1900 have not yet fruited. They were very small when set, probably only a year old. They and the Hoosic dwarfs (1905) have made a fair growth. Of the trees planted in 1897 all have borne fruit, and been reported save the Tyson (see report 1904). The Tyson is still barren, although the trees are vigorous, upright growers.

The Sudduth bears very freely but the fruit is comparatively worthless, resembling walnuts and having a thick, rough, tough skin. The flesh is coarse but rather sweet, juicy and pleasant to the taste. Season, October.

The Sheldon was exported this year to Glasgow with success.

Osband's Summer, President Drouard, Easter Beurre, Souvenir de Congress, and Idaho have been swept away by the blight.

Plums.

Japan Varieties: Of these the Satsuma, Chabot, Wickson, Burbank, Ogon, Normands and Blood were almost a failure, while the Red June, Willard and Abundance gave a good crop.

Domestic Plums: The Bradshaw, Niagara, Yellow Egg, Imperial Gage, Lombard, and H. R. Purple Egg gave a full crop, while the Glass Seedling and Reine Claude were almost destitute of fruit. One of the Bradshaw trees (planted 1892) gave 13 eleven quart baskets.

In regard to the duration of life of different varieties the following may be of interest:

Of 600 trees planted in 1892 these varieties are still living and healthy: Bradshaw, Yellow Egg, Niagara, Glass, Hudson River Purple Egg, German Prune, Shipper's Pride, General Hand, and Munroe.

The following varieties have mostly died, but the fruit trees have been replaced: Imperial Gage, Reine Claude, Lombard, Purple Egg, Gueii, Yellow Gage, Italian Prune, *Prunus Simonii*.

Lombard Improved: Planted 1899, fruited for the first time. So far as I can see this plum cannot be distinguished from the ordinary Lombard in form, color, flavor, nor season. Possibly there is the same distinction as that between the Bradshaw and Niagara.

Prince of Wales: Planted 1896, plum; medium size; oblong-round; very showy and handsome; season, about same as Lombard; yield, 3 eleven quart baskets per tree.

Staunton: An upright, vigorous grower, which seems worthy of a place in a commercial orchard; fruit, medium size; blue; oblong-round; firm flesh of good quality; season, early October.

Shropshire Damson: Planted 1896, gave a heavy crop of plums of even shape and quality; size, small to medium; oblong round; dark purple of fine quality; season, late September.

German Prunes Are not very satisfactory here, they drop too readily.

Grapes.

Campbell's Early: Planted 1904, bunches fair size; moderately compact; grapes black of good quality; season, between the Moyer and Moore's Early.

The Worden appears to require more severe pruning than some of the other kinds, owing to the presence of small green grapes in the bunch. The vines upon which too many fruit-canes were left seemed to be the worst in that respect.

The Eaton grape, while it gives an exceptionally large purple berry, sometimes nearly an inch in diameter, has not borne well here.

The Salem and Catawba ripen too late many seasons in this district. The general crop of grapes was heavy, 3 acres giving 10 tons of grapes.

Currants.

The following is the station record and description of varieties planted more recently. The older varieties and their habits are fully described in previous reports:

Commercial List: Red: Cherry, Fay, North, Star Prince Albert, Victoria, Wilder. Black: Collin's Prolific, Lee, Naples, Saunders. White: Grape and Imperial.

YIELDS of Currants in quarts per bush. for years 1902–1907 inclusive, with average per year.

—	1902.	1903.	1904.	1905.	1906.	1907.	Six years.	
							ctal.	Average per year.
*Baldwin				¼	1	½		
Belle d' St. Giles	2½	1½	1	1	2	2	10	1.67
*Black Victoria				½	1½	1		
*Boskop's Giant				¼	1	1½		
†Brayley	3	4	2½	4	2	3½	19	3.17
*Beauty				⅓	1	2		
Champion	3	4	2	3	2	1	15	2.50
*Comet				½	1	3		
Cherry	4½	5½	4	5	3	4	26	4.33
Collins	2½	5½	4	4	3	2½	21½	3.58
Crandall	4	4½	5½	4	3	3½	24½	4.08
Fay	3½	4	2½	3½	1½	3	18	3.00
Lee	3	4	2½	3	1½	2½	16½	2.75
Naples	3	4½	3	4	3½	3	21	3.50
New Victoria	4½	5	5	5	3	5	27½	4.58
North Star	4½	5½	2½	4	2	5	23½	3.92
*Perfection				½	1	2		
Pomona	4½	4	3¼	4	3	4	22¾	3.79
Prince Albert	4	4½	4	5	3	4	24½	4.08
†Raby Castle	5	6	4	5	3	5	28	4.67
Red Cross	4	4½	3¼	2	1	3½	18¼	3.04
†Red Dutch	6½	7½	4	3½	2	4	27½	4.58
Red Victoria	6	7	5	5	3	5	31	5.17
Saunders	3	5	4	4	2	2	20	3.33
*Standard				½	1½	1½		
*Success				¼	1	1		
Versailles	3	4	3	2½	2	4	18½	3.08
White Grape	4	5	2½	3	2	3	19½	3.25
White Imperial	3	4	1½	1½	1	2	13	2.17
Wilder	4	5½	4	5	2½	5	26	4.33

* Planted recently.
† Rather small, and therefore discarded, yet they give a heavy yield.

BALDWIN: Planted 1903, fair grower; fruit medium size; black; sub-acid; season, medium; yield, one-half quart per bush.

BLACK VICTORIA: Planted 1903, vigorous grower; fruit large; black; sweet, sub-acid; season, early; yield, one quart per bush.

BOSKOP'S GIANT: Planted 1903, strong grower; currant black; large, sweet, sub-acid; season, early; yield, 1½ quarts per bush.

BEAUTY: Planted 1903, very strong grower; berry black; medium size; sweet, sub-acid; season, medium; yield, 2 quarts per bush.

CHAMPION: Planted 1904, moderate grower; fruit black; medium to large; sub-acid; season, medium to late; yield, one quart.

COMET: Planted 1903, medium grower; fruit red; sub-acid of medium size; season, medium; yield, 3 quarts per bush; foliage, light green.

PERFECTION: Planted 1903, moderate grower; berry red; medium size; sweet, sub-acid; season, early; yield, 2 quarts per bush; foliage dark green.

POMONA: Planted 1897, moderate grower, fruit-red; medium to large; flavor, sub-acid to sweet; season, medium; yield 4 quarts per bush; foliage, dark green.

PRINCE ALBERT: Planted 1897, strong grower; fruit, red; small to medium; very acid; season, late; yield 4 quarts; foliage dark green.

STANDARD: Planted 1903, strong grower; fruit, black; medium size; sub-acid; season, medium; yield 1½ quarts per bush.

SUCCESS: Planted 1903, moderate grower; fruit, black; medium size; sub-acid; season, medium; yield, 1½ quarts per bush.

WILDER: Planted 1896, moderate grower; currant red; medium to large; sub-acid; season, medium; yield, 5 quarts per bush; foliage, dark green.

BLACKBERRIES.

Varieties so injured by frost that there was no fruit. Dorchester, Early King, Early Harvest, Early Cluster, Gainor, Humboldt, Maxwell, Minnewaski, Ohmer, Wilson Junior.

Varieties somewhat injured by frost: Eldorado, Erie, Lovell's Best, Kittatinny, Wilson's Early, Wachusetts.

Hardy Varieties: Ancient Briton, Agawam, Stone's Hardy, Taylor, Western Triumph, Snyder.

Undesirable varieties would appear to include the first two lists.

Commercial List: Ancient Briton, Agawam, Snyder and Western Triumph. For the first time at this station Eldorado and Wachusetts were injured by the winter.

COMPARATIVE YIELDS OF BLACKBERRIES FOR YEARS 1903-1907 INCLUSIVE, WITH AVERAGE PER ROW OF EIGHTEEN FEET EACH YEAR.

	1903. Quarts per row.	1904. Quarts per row.	1905. Quarts per row.	1906. Quarts per row.	1907. Quarts per row.	Five years' total.	Average per row per year.
Agawam	5	6	4	6	4½	25½	5 1/10
Ancient Briton	6	5	6	7½	6½	31	6 1/5
Dorchester	½	.....	1½	1	.....	3	3/5
Early Cluster	1	.....	.....	1½	.....	2½	½
Early Harvest	4½	.....	.....	½	.....	5	1
Early King	3½	.....	.....	¾	.....	4¼	17/20
Eldorado	2	4½	3	4½	1½	15½	3 1/10
Erie	5	.....	3	5½	2	15½	3 1/10
Gainor	3½	.....	.....	½	.....	4	⅘
*Humboldt	.....	.....	.....	4¾	.....	4¾	19/20
Kittatinny	4	.....	3	5	4	16	3⅕
Lovett's Best	3	.....	1½	2	1½	8	1⅗
Maxwell	1½	.....	.....	1	.....	2½	½
Minnewaski	1	.....	1½	1½	.....	4	⅘
Ohmer	3	.....	¾	1	.....	4¾	19/20
Snyder	6½	6	7	7	6¾	33¼	6 13/20
Stone's Hardy	4	3½	4½	4½	4	20½	4 1/10
Taylor	4	5¼	4½	5	3½	22¼	4 9/20
Wachusetts	1	2	1½	2	1	7½	1½
Western Triumph	5	6	6½	7	6	30½	6 1/10
Wilson's Early	2	.....	1½	1½	1	6	1⅕
Wilson's Junior	1½	.....	¾	1	.....	3¼	13/20

*Planted 1902.

LAKE HURON FRUIT EXPERIMENT STATION.

By A. E. Sherrington, Walkerton.

General Notes.

The winter of 1906-7 could not be considered an ideal one for the fruit grower in this district, owing to the mild warm weather of January and February, which started the fruit buds into growth and then followed very cold, frosty weather with late spring frost, killing a large percentage of the buds of the raspberries and Japanese plums also the Duke and Bigarreau cherries.

The apple crop was a very good one in this district, but at the station the crop was rather light owing largely to the heavy crop of last year. In 1906 the yield from the five acre old orchard was between 700 and 800 barrels. This year the yield was 500 barrels.

Picking Cuthbert Raspberries at A. E. Sherrington's, Walkerton, Ont.

Clean cultivation is practiced on the whole of the farm. The apple, plum, cherry and pear orchards are cultivated frequently during the growing season, and a light coat of barnyard manure and wood ashes are applied once a year. We find this keeps up the vitality of the trees and gives us annual crops. The young Experimental Apple Orchard is doing very well and quite a number of the trees are coming into bearing but I find quite a number are not true to name, which is very dissappointing. No additional planting was done at the station last spring, except to fill in blanks where trees had been killed by frost or other causes.

No record of yield was kept this season, as I do not think this necessary for the reason it is impossible to keep a strict account of the yield of each variety.

Apples.

The apple crop, as stated above, was a very good one in this district, but lighter at the station than last year. A few of the newer varieties fruited for the first this season. Only a few varieties will be mentioned in these notes:—

Canada Baldwin: Tree upright; vigorous grower, ten years old; fruit medium to large; promising.

McIntosh: Tree spreading, vigorous and hardy; fruit large; commenced bearing at seven years of age.

Star: Tree only a medium grower; fruit large; color, greenish yellow; juicy, pleasant flavor; season, September and October; commenced bearing at eight years old.

Scarlet Pippin: Tree upright, spreading; fruit medium size; color, yellow striped and splashed with red; nine years old.

Stark: Tree vigorous, spreading, an early bearer; fruit uniform, medium to large; commences bearing at seven years; a very promising commercial apple. The apples shipped from this district will amount to fifty thousand barrels.

Blackberries.

The blackberry crop here was a total failure. The plants were nearly all killed out, but made a very good growth again this season. The varieties that have given the best results here are Agawam, Eldorado, and Snyder; but I cannot recommend the growing of blackberries in this district.

Red currants were a very fair crop, but blacks were very light. The demand for this class of fruit has been on the increase for the last two or three years. Out of some twenty varieties under test, the Cherry, Fay, Prince Albert and Red Cross among the red varieties, have given the best results. They are all large and the fruit of good quality.

The two varieties of black currants that have succeeded here are the Champion and Naples. They have given the largest yields and have proved hardy; fruit large and of good quality.

White currants are not in demand. The best varieties are White Grape and Imperial.

Cherries.

The Morello crop was good, but all of the Duke and Bigarreau class had the buds killed. The most profitable varieties for this district are, English Morello and Montmorency. Early Richmond is a good cherry, but the birds take the whole of the crop. Quite a number of the black varieties have been killed outright, and the most of these sorts will be removed and replaced with better sorts.

Gooseberries.

The gooseberry crop was a grand one this season, and the prices were also good. Downing and Pearl are grown for main crop and the yield from three hundred bushes was one hundred and fifty eleven quart baskets. These are American varieties, and are not subject to mildew. The English varieties did not mildew as badly this season as sometimes, but still enough to make them worthless for market. We have a number of other varieties that have not fruited as yet in sufficient quantities for me to be able to make any report on them.

Pears.

The pear crop was a fairly good one, but not much growth in the district. The orchard at the station has not done very well the last year or two.

The French pears planted in 1900 are not proving a success. They are very subject to blight. We have lost quite a number this season and none of them have borne much fruit as yet, only a few specimens of poor quality.

As stated in previous reports, I have top worked Kieffer stocks with some of the French varieties in hopes of getting a better tree and one that would perhaps come into bearing a little sooner, but I have been disappointed; for after making a good growth for one or two years, the Kieffer stock seems to either winter kill or die from some other cause. I have top worked a number of other varieties on Kieffers, with the same variety growing in the same row on its own stock, in order to see if any improvement will result.

The best varieties for this district are Clapp, Bartlett, Louise, Clairgeau.

Plums.

The plum crop at the station was very good this season. Such varieties that were not damaged by frost or had the buds killed last winter, gave large yields. Nearly all of the Japanese varieties have been killed out, and those that were not killed had the buds so badly damaged last winter that they scarcely leafed out. The varieties that gave the best yields and have withstood the hard winters are Bradshaw, Englebert, Field, Gueii, Imperial, Lombard, Pond's Seedling, Quackenboss and Yellow Egg. Saunders has proved to be quite hardy, also a large number of others. Gueii and Quackenboss yielded fifteen baskets per tree. The quality was good and all sold for good prices. Gueii, Quackenboss, Yellow Egg, Imperial, Grand Duke, Monarch, Arch Duke, Field, Englebert, Bradshaw and Lombard are among the most profitable sorts. Among the newer sorts that commenced to fruit this season are, Arch Duke, Giant Prune, and some others, but not in sufficient quantities to be able to give any report upon them.

Peaches.

The peach trees that were planted since the hard freeze have again been all killed out. Not one is left, and now they will stay out.

Raspberries.

Raspberries were almost a total failure here this season. Warm, mild weather during the winter months and then hard frosty nights later on, killed fifty per cent. of the buds; then the dry summer nearly completed the ruin. The old, experimental plot was broken up a year ago, so at present we have only three varieties of red raspberries—Marlboro', Herbert, and Cuthbert. These three are the only varieties that are worth cultivating. The Marlboro' ripens a few days before Herbert but the quality is not so good as Herbert. Herbert ripens a few days before Cuthbert, but is not so good in quality. The best yielders are, in the order named, Herbert, Cuthbert, Marlboro'; in quality it is Cuthbert, Herbert, Marlboro'. In ripening it is Marlboro', Herbert, Cuthbert.

A new plantation will be planted the coming spring, and these three varieties will comprise the commercial sorts.

Blackcaps have not been doing well for the last two or three years. The two most reliable varieties are Conrath and Hilborn, but Hilborn is much the best, as it is very hardy and the fruit is first-class.

Strawberries.

The strawberry crop was only a medium one this season, owing to the severe dry season. Our prices were good, making up for the low yields.

The varieties that have proved to be the most profitable at the station are Brandywine and Saunders. A number of other sorts are under test, but none has yielded equal to Brandywine. The demand for this berry has increased two-fold in the last two or three years. The quality is first-class, and its shipping qualities cannot be beaten, but it requires a good clay loam to do its best. It does not succeed on light or sandy soils.

Insects.

The Insect that caused the most loss to the fruit grower this season was the Codling Moth, and I do not think that it was ever known to be as bad. I think that twenty-five per cent. of the apple crop was destroyed by this insect, but it was found to be much worse in sod orchards than in cultivated ones, and also in orchards having rail fences or any rubbish lying around; even grass is a harbour for the Codling Moth. If orchards are kept clean, well pruned and sprayed, one will not be much troubled with the moth.

Other insects were not troublesome except the larva of the May Beetle. This insect has done a good deal of harm in the strawberry plantations. It also has caused considerable damage among potatoes the last year or two.

BAY OF QUINTE FRUIT EXPERIMENT STATION.

By W. H. Dempsey, Trenton.

Apples.

Many of the growers in this district white-washed their trees early last spring in the hope of killing the bark lice which were destroying many of their trees. Though too late in the season to be effective, it showed their increasing interest in bettering the greatest industry in this part of Ontario.

In spite of all this trouble the crop was not as good as it might have been had the season been otherwise. The season was very unusual, and the results as a whole are rather disappointing, as both quality and quantity have suffered from peculiarities of the season. In the first place the apple trees were three weeks later in coming into bloom than in other years. This, followed by unusually dry weather lasting until the picking season, was the cause of apples being but little more than half grown at the time when picking should have begun. The result was that in the rush of gathering it was necessary to pick undersized apples which should have had a longer time in which to mature. Had it not been for the drouth the crop would in all probability have been a very large one and mostly No. 1.

Insects and Fungi.

Though the insect pests were minor features compared with the effects of the drouth some were so severe that mention should be made of them. The Codling Moth was not so injurious as in '06. The Apple Maggot was present in considerable numbers this season damaging apples in some localities. Owing to the dry season, and absence of fog, the usual fungi were very scarce.

However, the Dry Rot, a disease new to my district, made its appearance this season causing great losses in some orchards, one orchard losing about

$1,200 through this alone. It is due to the lack of moisture in the soil, the trees becoming unable to support the growth, consequently the inner tissues break down causing the disease. As the decomposition spreads through the apple to the skin, the skin sinks, and gives it the appearance of being pitted. One feature of this disease is that affected fruit is very hard to detect in the early stages, and thus the fruit is liable to go into barrels for market which results in a loss, as the fruit will not stand up for shipment, causing slack barrels.

As the disease was a formidable enemy only in uncultivated orchards, its prevention is easy, it being only necessary to cultivate, and thus preserve the moisture for the trees in place of letting the clover or sod take it away. Another great lesson for us was given by the early frosts, which seem to point out that every grower should have the picking of his apples under his own control, thus avoiding danger of early frosts, and also being able to see that each variety is picked in its proper season and not picked until fit.

Bird's eye view of W. H. Dempsey's orchard and home, Trenton, Ont.

In Fruit Experiment Station Bulletin 147 a list of apples was recommended for this district, after ten or twelve years of testing. Reasons are here given for recommending the list:

Duchess: This is the best of the early apples and one which can be handled in both home and foreign markets.

Trenton: This variety because of its color, quality and good shipping qualities is recommended for commercial lists.

Gravenstein: Is a good bearer and carries well.

Alexander: A large apple; does well in old country markets, but is not a favorite in Canada though a good cooker.

Fameuse: Is not only good as to shipping qualities, but has qualities in flavor and texture which help to sell it anywhere, and notwithstanding the fact that it is subject to spot it is a profitable apple if cared for as it should be.

McIntosh Red: This apple promises to succeed the Snow. It is subject to spot and needs care, but it will produce well and sell well in home markets.

King: Though a shy bearer on some occasions and subject to sun scald, the King can by care be perhaps made to pay and pay well, as it usually gets a high price in any market.

R. I. Greening: Though this variety has a delicate tree it may be made, with a little of the proper care, into a paying variety. There is a good demand for Greenings, not only for ordinary cooking but also because it is one of the best pie making apples.

Baldwin: Though this year a little under size, this apple is one that makes good stock in markets for winter. It is adapted more especially to heavy land and here it will give best results, though it sometimes does very well on lighter lands. The trees are apt to freeze in very severe winters.

Seek: This apple is a good cropper, bright color in most cases and sells well, but should, like most other varieties, have good care and proper food. It is a good apple for early winter shipping.

Spy: This is an old standby; it will sell almost any time and anywhere owing to its superior quality. The trees are hardy and give very satisfactory results. The fruit, however, does not keep in a way that is always the same, some years it will stand long storing while in others it will not ship.

Tolman Sweet: This is the only sweet apple on the list and is the best of all sweet apples. It would not be wise to plant heavily of this variety.

Ben Davis: This is a great producer, producing apples at a very cheap rate per barrel. It has good color, keeps well late into the season, and carries well to foreign markets. It is better than the so-called substitutes which agents are selling, as Gano, for instance.

Stark bears well, but the fruit, while in other ways suited to markets, is dull in color compared with Ben Davis. It, however, stands storage and carries well if not held too long.

Primate is recommended for domestic use. The fruit ripening unevenly, is of good quality, and extends over considerable time. Thus it would be adapted for home use where a very large supply is not needed.

Promising New Varieties.

A few of the promising new varieties are:

Warren Pippin: A green apple ripening in September, it is uniform in size and carries well.

Coo's River: A red apple; bears every other season; good quality fall apple.

Golden White: A medium sized red striped apple, very pretty. As this is its first year to bear in quantity large enough to ship, it is hard to say just what it will do.

York Imperial promises to do well for a winter variety. It is uniform and hangs well; fair color.

To those who are thinking of planting, I would say that it is a wise plan to plant enough of a variety to insure getting a carload or nearly so, which ensures a more ready sale. It is also advisable to have apples covering the whole season, and so avoid the rush at picking time. Another good thing is to plant the best varieties, and not too many kinds, as this causes piece cars of fruit, and demands more skill in providing proper attention.

Pears.

Pears were a good crop; the weather conditions did not seem to have as serious an effect on them as on the apples.

Bartlett: Bore a large crop. The fruit was on an average smaller than other years.

White Doyenne: Bore well: the crop was uniform in size and sold readily.

GIFFARD: Was well loaded and was fit for market early. The fruit was of good quality.

HARDY: Also had a considerable load of pears, but they were not so large as last year.

GOODALE: Was very heavily loaded, the fruit perhaps a little undersize, but was very uniform.

KIEFFER: This variety though not of as good quality as the others loads well. If an attempt was made it is probable that these could be grown in large quantities for canning purposes and leave a good margin.

SIMCOE FRUIT EXPERIMENT STATION.

By G. C. CASTON, CRAIGHURST.

General Notes.

There was very little in the way of new stock received for planting. A few currants, including some new varieties, and some of the old, standard sorts and two trees of the seedless apple.

Home of G. C. Caston, Craighurst, Ont.

This year was a year of extreme drouth—the most severe in over forty years. Orchards in sod suffered severely, but those cultivated came through fairly well. The apple crop at one time did not look as if much of it would be fit to pack, but when the September rains came, they grew so rapidly that there was a fair crop of pretty good quality after all. The apples averaged smaller than usual and a larger percentage than usual had to be packed No. 2, but they were very clean and free from scale and other blemishes, so that No. 2 stock this year, except in size, was quite equal to the No. 1 of other years.

Pears did very well this year, though not grown extensively in this locality. Those who had a few year trees got a very fair crop. The varieties that seem to do best here are, Flemish Beauty, Bartlett, Clapp's Favorite, Louise Bonne and Kieffer. The latter ranks among pears as the Ben Davis among apples.

Small fruits, with the exception of strawberries, were a total failure. Raspberry and blackberry canes seemed to suffer from winterkilling, and the extreme summer drouth finished what the winter had begun. The fruiting canes bloomed well and set fruit, but dried up and died during summer. We will be under the necessity of laying down the canes in winter unless we can get something hardier than we have now.

Apples.

Top-Grafted Apples. For the last twenty years I have been advocating the top grafting of our best apples, and experience proves that I have been right. I am now getting results from top grafting done in former years, and invariably it is the top-grafted trees that give the best fruit. The Spy, the Baldwin, and the Greening can be grown successfully here, and are of the very best quality by this system. The King, I have reason to hope from results so far, may by this plan be made to produce paying crops, and the fruit is second to none grown anywhere else in Canada.

The question of the most suitable stock for the purpose is one that calls for further experiment and investigation by all experimental stations in Canada, for there is much yet to learn. The stock must be hardy and healthy, and of such habit of growth and texture of wood as will make a perfect and smooth union between stock and scion. One of the best so far tested for top working winter apples on, is the Tolman Sweet, although I have had good success with Spy worked on Yellow Transparent and a number of other Russian varieties. King is doing well on a number of the Russians, while the Russet, Astrachan, and Duchess are almost useless for the purpose. The latter, because of its slow wood growth, does not unite well. There are a number of other varieties that are not suitable, such as Wallbridge and a number of the Crabs. Experiments, observation and research along this line will be of undoubted value to apple growers.

Golden Russet: I would not for my own part plant Russets. If I got the trees as a gift, as I consider it a most unsatisfactory apple to grow. The tree is hardy, but not productive, and it is not wanted in the home market. On account of the size of the apple and its light bearing, it costs more to pick than any other. It has to go abroad to find a market, and altogether I consider it an unsatisfactory apple to grow.

Gano: This, like the Ben Davis, while a great bearer and a handsome apple, is only half hardy, and is proving susceptible to winter injury; so that those who wish to grow this apple in this locality would do well to top graft it.

Boiken: This variety is also showing signs of winter injury. It is the earliest bearer and most productive apple tested here. The fruit is bright and clean, and, though not of high quality, is one of the longest keepers.

Stark: This apple is proving an acquisition for this locality. The tree is quite hardy, quite productive and the fruit of fair quality. It is a good shipper. I have no hesitation in recommending this apple to intending planters.

Salome and the Russian apple Bogdandoff: These would do well probably for localities farther north, where they cannot grow the better

class of winter apples. I do not recommend them here for the reason that we can grow something better.

CANADA BALDWIN: This apple has fruited two years and seems to be a hardy, thrifty tree. The fruit is only medium in size, but is solid and firm; evidently a good keeper. The color is bright and attractive. This apple is worthy of further trial.

FALLAWATER: Large, clean smooth, attractive. It evidently will do well here. I have planted a large number of these in my new orchard.

WINTER MAIDEN'S BLUSH: Very good in both tree and fruit. Tree is healthy, hardy and thrifty. Fruit much larger than the fall variety of the same name and makes good its claim as a winter variety.

WEALTHY: One of the most unsatisfactory fall apples in my estimation. I would not plant it or advise anyone else to do so, for several reasons. The first years of bearing, the fruit will be fair, but as the tree gets older, it overloads and will not mature half of its load. You get a few good ones out of the centre top of the tree, but the side limbs are loaded with a lot of small rubbish that never matures, and is unmarketable. As soon as any of the fruit approaches maturity, it falls off, and it is safe to say that not half the apples grown on Wealthy trees are ever marketed.

YELLOW TRANSPARENT: While I would not recommend the planting of this on a large scale, yet for any one near a railway who can ship in baskets, it is a profitable kind for the purpose, as it is the first apple of all that is fit to cook. It is ready for that purpose long before Astrachan or Duchess.

PRINCESS LOUISE: One of the very nicest Christmas dessert apples that I know of. The tree is thrifty and seems when of bearing age to be quite productive. The fruit is only medium in size, and is very susceptible to the fungous scab, so that it requires attention to the pruning and spraying of the tree. But, withal, it might be profitable to grow as a choice dessert apple.

MCINTOSH: This variety is somewhat erratic and irregular here. Like the Snow, it is subject to scab, and does not bear regularly. Some years, like the present, it will do wonderfully well. We had the finest McIntosh here this year I ever saw; but this only occurs once in two or three years, so it is doubtful if it is advisable to plant it largely here. Shiawassee Beauty would be more profitable, though not such a high class dessert apple as McIntosh; yet it is of the same origin and has a strong smack of the Fameuse flavor in it.

BAXTER: This apple was remarkably fine this year, and, although like Fameuse and McIntosh it is very susceptible to fungus scab, yet if kept well pruned and sprayed, it is a profitable apple to grow here. It is a regular bearer. The fruit is large and highly colored. It has no claims to dessert quality. The flesh is a little coarse, but it is a first-rate cooking apple, and when free from scab and bright and clear as it was this year, it will always sell well in any market. Its season is October to February here.

From my experience so far, my selection for a commercial apple orchard would be, to cover the season: For extra early, a few trees of Yellow Transparent for basket shipments. Then Duchess, and for fall shipment, Alexander, Blenheim, Pippin and Wolf River; for late fall or early winter, Baxter; for Christmas dessert apples, Fameuse or Princess Louise, and a few trees of McIntosh.

For winter varieties, first and foremost, the Northern Spy. Fully half the orchard should be Spy; then Baldwin, King, and Greening, these four to be in all cases top grafted on Tolman sweet or other hardy stock. These

might be supplemented by a few other winter sorts that are hardy enough without top grafting. These would be Stark, Fallawater, Westfield, Seek no Further, and Pewaukee.

This would cover the season and would be enough of varieties. It is a common error to plant too many varieties.

A list of varieties of apples not considered worthy of further cultivation in Simcoe County:

Wallbridge, Sutton's Beauty, Barry, Cooper's Market, Haas or Fall Queen, Lubsk Queen, Anisim, Chenango, Gravenstein, Aiken's Red, Hamilton, Montreal Peach, Dominie, Fanny, Gideon, Star, York Imperial, Clayton, Yates' Red, Winesap, Fall Pippin, Keswick Codlin, Brockville Beauty, Primate, Jersey Sweet, Cranberry Pippin, Magog Red Streak, Longfield, Sherwood's Favorite, Blushed Colville.

Pears.

I have a small block of Clapp's Favorite which I bought from a nursery for Flemish Beauty for the purpose of top grafting, and when I found they were Clapp's, I let them grow as they were, and did not top graft them. These are now beginning to fruit and are quite satisfactory. The trees are quite healthy and hardy and have done better than any pear I have ever tested. This is a case wherein the nurseryman sending trees untrue to name has resulted in good, for I would not exchange this block of trees now for any variety of pear. I would have no hesitation in recomending this variety as one of the very best to plant here. True, it is early and a short keeper, but it is large, handsome, of good quality, sells well and at highest prices. They went off like hot cakes at 75 cents a basket this year.

I have been top working Flemish Beauty with Bartletts for several years, and although they have done fairly well, I would have done better to have used Clapp's instead, as it is far the best of the two here. Giffard is a failure here, and I am sorry that it is so, for it is a very nice dessert pear.

Idaho, Vermont Beauty and Dempsey are not suitable for this section, though perhaps they might do, top grafted.

Dwarf pears worked on quince roots are of no use here. I planted a small block of Dwarf Duchess a few years ago and they are all gone. The Russian Pears thrive and bear well, but the fruit is of such poor quality that they are not worth growing. I would not advise anyone here to grow them, when we can grow some of the very best kinds successfully. I have tried top working those Russians with rather poor success. They do well for a while, but soon fail. The union was not satisfactory.

Bosc: This pear was an utter failure here.

Kieffer: Does very well, but I would not waste good orchard land with them.

The outstanding feature in my experiment with pears is the good showing of Clapp's Favorite. I am more than pleased with it. That it is likely to continue is proved by a neighbor of mine who has a tree, planted many years ago, and off which he sold $12 worth of pears this year.

Plums.

The average life of a plum tree this far from the Great Lakes is very short. You may get a few crops of very fine fruit and then an unfavorable

winter will come along and finish most of them. Of a great many varieties tested here, both Japans and the European class, one stands out prominent surviving the rest. I got it under the name of Staunton, though it very much resembles Glass Seedling.

I have not seen any of the American varieties that are worth growing, though they have the merit of hardiness.

Cherries.

My experience with cherries goes to show that it will not pay to grow them as commercial orchard fruit in this locality. Farther to the northwest from here, 20 miles nearer the Georgian Bay the Dukes and Morellos will do fairly well, but the same is true of cherries as of plums; that they will never be profitable very far inland from the Great Lakes. For those who wish to grow a few for domestic use, probably the best selection would be Orel, Ostheim, Russian 207, E. Richmond, and perhaps Montmorency.

I have come to this conclusion after a fair and careful test of some forty varieties, mostly of the Morello class. It is to be regretted that the test of cherries has been disappointing, for the demand for them is so great that the supply is never equal to it.

Strawberries.

I tried a great number of varieties of strawberries and am as far as ever from the ideal or perfect berry. Perhaps we will never get it. The best all around berry for the past few years is the Williams, though it has the fault of the white tip; yet it is one of the best here since the passing of the old Wilson's Albany which in its day came the nearest to perfection of any ever grown here. The most productive variety has been the Crescent, but it was rather acid, lacking in quality and rather soft. It is still productive, but it is running out, as it has been a long time in cultivation.

I have now under test Dunlop, Glen Mary, Miller, Tennessee Prolific, Wm. Belt, and Three W's. I have also some seedlings of my own, among which I expect to have some better than many of the varieties now in cultivation.

Raspberries.

Raspberries were a total failure this year. Cuthberts are the principal variety planted, and they always suffer more or less from winter injury, but this year the drouth finished what the winter began, and a failure was the result, although the crop was well and regularly cultivated and fertilized.

It has been suggested to lay down the canes for winter. I am going to try the experiment with blackberries, but I hope to have a variety of raspberry that won't need it, and I expect we will find it in the Herbert, of which I succeeded in getting a stock of plants last spring. These have made a most satisfactory growth, and if all that is said of the Herbert as to hardiness is true, it will be just what we need here.

Eaton: A new variety from Michigan which fruited this year. I had but a dozen plants, and though the drouth was severe, they produced some very fine fruit. The flavor of the berry is not of the best, being rather acid, but, the fruit is large and handsome and the canes seem quite hardy so far.

Louden is a nice berry, but the canes are not vigorous and are slow of propagation. The same may be said of the Miller and I think neither of these would be satisfactory for a commercial plantation.

Blackberries.

I have this year under test the Gainor and a new variety, the Mercereau, for which considerable merit is claimed. If we can get a blackberry of as good quality as Eldorado and hardy enough to stand a temperature of 25 degrees below without injury to the canes, it would be a great acquisition.

The blackberry crop was a failure this year. Winter injury to canes and severe drouth of summer following made the failure complete.

GEORGIAN BAY FRUIT EXPERIMENT STATION.

By J. G. Mitchell, Clarksburg.

It is not intended in this report to give detailed descriptions of individual varieties, (as this work is now well covered by the "Fruits of

Experimental plum orchard at John Mitchell's, Clarksburg. Trees four years planted. Intercropped with sugar beets.

Ontario"), but to give general desired information for the benefit of planters, the Georgian Bay district in particular. Although the growing of plums forms a very important branch of our horticulture, and there is no place I know of where plums can be grown to greater perfection or advantage than in this district; yet now they are only a side show as compared to the great business that is being developed here in the production of commercial apples for export.

Plums.

This fruit being my specialty for experiment, will deal with them first.

Although the season of 1907 was extremely dry, yet we had a magnificent crop, by which we gained much conclusive evidence of the correctness of previous reports, and many object lessons.

From observation and extensive investigation of the requirements of the markets, also the various ways in which plums are used, we find the great buying public are now, more than ever, demanding quality, and rightly too. When people pay good money they should certainly receive value. Our canning factories require great quantities of plums if they can procure the right kinds, otherwise they don't want them at all. Yellow plums are in more demand than dark colored varieties, and are also, generally speaking, of better quality.

The only plums to fill the requirements are a few of the well tested European varieties. The following will pretty well cover the season; they have all been well tested here and are the very best of our nearly two hundred varieties of well tested plums: Washington, Imperial Gage, Bradshaw, Lombard, Quackenboss or Glass, Prune d'Agen, Arch Duke, Yellow Egg, Coe's Golden Drop and Reine Claude. To these might be added Red June, a Japan, on account of its earliness. This is the only Japan plum that I would plant in a commercial orchard. It is the first plum to ripen.

Japan Plums. Although quite hardy, rapid growers, and abundant bearers of beautiful fruit, they have been the most disappointing. Their quality is so poor they spoil the sale of better plums. There are few who buy Japan plums who want plums of any kind for some time to come. We have given all the leading varieties of Japan plums a thorough test, and in my opinion these plums have done more to make plum growing unprofitable than all other factors combined.

To those who would still plant Japan plums the following are the best: Red June, Burbank, Satsuma and Chabot. These cover the season in the order named. They are all quite hardy,

American or Native Plums. Out of all our extensive list, and I think we have the best of them, there is not one variety, of this class of plum which I could recommend. They are of no use in the best plum sections only an incumbrance to the ground; with us unsaleable and never made a dollar. Stoddard, Wild Goose, Milton, Cheney, Forest Rose, Forest Garden, Wolf, Weaver, Chas. Downing, Pottawatomie, and Whitaker are about the best. In quality, they are about the same as wild plums, the only differences being in size, color, and time of ripening.

Cultivation. Plums require the same generous care, cultivation and fertility as any other fruit crop. None will respond more quickly or give better returns for the time and money invested than plums. It is useless to try to grow good plums without thorough cultivation. To conserve moisture, which plums greatly need in their growing season, cultivation should begin in the spring as soon as the ground is in good working condition and continue until July, when cover crops should be sown. When conditions are suitable we prefer clover, and have had some very fine stands, when sown about the first of July. If not suitable for clover sow peas, oats, barley or rye. I would rather have the ground covered with a big crop of weeds than nothing at all.

This will apply to apples as well as plums. I had ample evidence of this last summer and many object lessons. When driving about the country, one could tell the cultivated orchards by their foliage, quite a distance away, and there, invariably was where the best fruit was found. Not only that, but usually from two to three times as much of it, with from fifty to seventy-five per cent. No. 1, while in the neglected orchards there was very few No. 1 to be gathered. In the face of the fact that No. 1 apples sell from one to two dollars per barrel more than the No. 2, this is surely an object lesson worth remembering. Fruit trees must be well fed and

cared for. This will apply to all kinds of fruit. We cannot grow high quality fruit without good feeding and care, any more than we could raise good animals.

Insects and Diseases. Codling Moth did more damage than anything else. In some unsprayed orchards fifty per cent. was ruined, while in orchards well sprayed and cared for, there were very few wormy apples. This is another object lesson.

Apples.

During the last few years a great forward move has taken place in the production and sale of commercial apples. This is largely the result of information and experience gained through the experiment stations in this district.

Growers have organized themselves into a strong co-operative company, known as The Georgian Bay Fruit Growers, Limited, incorporated under the Ontario Companies' Act, and having a list of nearly three hundred stockholders and patrons. They have already built and operate two of the best apple storage buildings in Canada, one at Thornbury, and the other at Meaford. Each has a capacity of ten thousand barrels. With the practical test of fifty varieties on the station grounds, and the handling and selling of about one hundred and twenty varieties through the Fruit Company, it gives us a great opportunity to determine values.

Out of all this long list, and this includes nearly all the recommended new varieties, only a small percentage are the money makers. Basing the value of apples at one dollar per barrel, and this is the average price paid by the buyers in Ontario, ninety per cent. make no money over and above expenses. This may seem a little overdrawn; such is not the case, but cold facts, the result of several years' experience with actual sales on the foreign and home markets. This should not be, if planters selected the varieties wanted by the trade, and for which they are usually ready to pay a good price, for from fifty to seventy-five per cent. more would be made by the same investment, than if a large number of indiscriminate varieties were planted.

The following are a good list and do exceedingly well in the Georgian Bay district: Duchess, Gravenstein, King, R. I. Greening, Baldwin, Spy, Golden Russet and Mann. The two last named require deep rich soil.

Pears.

There is no difficulty in growing all the leading varieties of pears here. We find them to succeed quite as well as apples. In the recently set trees we have nothing to report only good growth. The older trees are giving a good account of themselves. The following are the cream of the list; no one wanting pears need have any hesitation in planting them, at least for a depth of several miles back from the water front all the way along the south shore of the Georgian Bay: Bartlett, Duchess, Clapp, Flemish, Anjou, Howell, Louise, Lucrative, Clairgeau, Goodale, Bartlett, Seckel, Kieffer.

Cherries.

We had a fine crop of cherries this season, nearly all varieties fruiting. For profit, Montmorency easily leads them all. Windsor produced a very

nice crop, but were mostly gathered by the birds. May Duke, had a very pretty crop of excellent cherries. Olivet succeeds wonderfully well some seasons, but other is rather shy. It is always a good seller. Ostheim is very hardy, branches slender and rather straggling grower, fruit medium size, color dark and red. Yellow Spanish is scarcely hardy enough for here. Some winters the buds are injured by frost. It occasionally does very well.

In my experience, Montmorency, May Duke, Olivet, Early Richmond, Black Tartarian, and what are known here as common Red and Black are the best bearers, and scarcely ever fail.

Grapes.

Enough has been done to show that grapes can be successfully grown here, yet we would not advise the planting in large quantities. The Niagara district being about ten days in advance, they have the market so much earlier, there is no use in growing only for home use.

Champion, Green Mountain, Diamond, Niagara, Brighton, Delaware, Salem, Vergennes, Pocklington, and Worden, we grow and ripen. These are all quite hardy and very little trouble to raise.

Berries, Currants and Gooseberries.

I do not know of any one here who makes a business of growing small fruits for market, and there are few places where they could be grown to better advantage. The deep snow in winter gives ample protection, and there is no such thing as failure. All the leading varieties of small fruits grow to perfection with the least possible trouble.

ST. LAWRENCE FRUIT STATION.

By Harold Jones, Maitland.

Character of the Season.

The winter of 1906-7 was normal in this section and favorable for fruit trees in general. There was a fair covering of snow which laid evenly on the land, and frost did not penetrate to any great depth. Winter actually set in on December 1st, one day later than the previous year, when ploughing was stopped, the temperature going down to 1 degree Fahrenheit with a light covering of half an inch of snow, which gradually increased in depth to 5½ inches by December 29th, which depth was practically maintained all winter up to March 11th.

January 20th was the coldest day of the season, the thermometer falling 20 degrees below zero.

April was cold with frequent showers, fruit buds remaining perfectly dormant.

May was cold, cloudy and dry, which did not advance vegetation.

During the month of June we had favorable growing weather. Cherries were in full bloom by June 5th. Fameuse in full bloom on June 8th, 20 days later than normal.

Cherries, Pears and apples came through without injury, but plum trees suffered in fruit bud. Strawberries wintered well, and gave good crops where well mulched, but were a failure where the ground was bare and hard, lacking in humus.

Currants of all kinds were a full crop. Gooseberries were a full crop with no mildew. Raspberries were severely injured and the crop a failure.

Insects.

Insects were not numerous. The Codling Moth was kept well under control by thorough spraying just as the blossoms fell. Red-humped Caterpillar and Fall Webworm appeared in some numbers but did not do material damage. The Tussock Moth was not so much in evidence as in former years and did very little damage.

Spot fungus was kept well under control by three sprayings, but in orchards unsprayed a considerable ¬ercentage of the fruit was affected.

Apples.

My notes on varieties published in the reports of 1904, 1905, and 1906, require very little correcting. I append the folowing notes on varieties that have not been completelv reported as yet.

Blunt: Planted 1897; a round, compact vigorous tree; hardy; ripening its wood well; fruit large, 3 to 3½ inches; yellow, striped and splashed with red; a nice looking apple. This tree is very slow to come into bearing. In 1906, I harvested three or four specimens, and about the same number this year. It needs further trial to prove its value.

Boiken: Planted 1897. Tree suffering to some extent with sun scald and blight, not a very vigorous grower; indications are that it will die out in a few years; not a safe variety to plant.

Chenango: Tree planted in 1896. Comes into bearing four or five years after planting. A desirable dessert apple for September, but has not shown vigor. All three trees died this summer after coming into full leaf; although they were well protected by snow during the winter previous.

Excelsior Crab: Planted 1897. Tree hardy vigorous and very prolific; fruit hanging to the tree well; more like an apple than a crab but has some characteristics of a crab; similar in many respects to Switzer, though somewhat smaller in size; should give good results and be of value to northern sections.

Gano: Planted to some extent in 1900. Tree is proving somewhat hardier than Ben Davis; fruit medium, of a brilliant dark red with long keeping qualities; promises to be of value for the section as a late winter apple.

Langford Beauty: Planted in 1897. Trees not true to name as sent me, but from what I have seen of this variety it is worthy of trial, as it can well fill a place in the market following Astrachan which does not grow to the same perfection as the same fruit in the western part of the Province.

Mammoth Black Twig: Top grafted 1900, a hardy, vigorous tree, prolific, holding its fruit well, worth further trial.

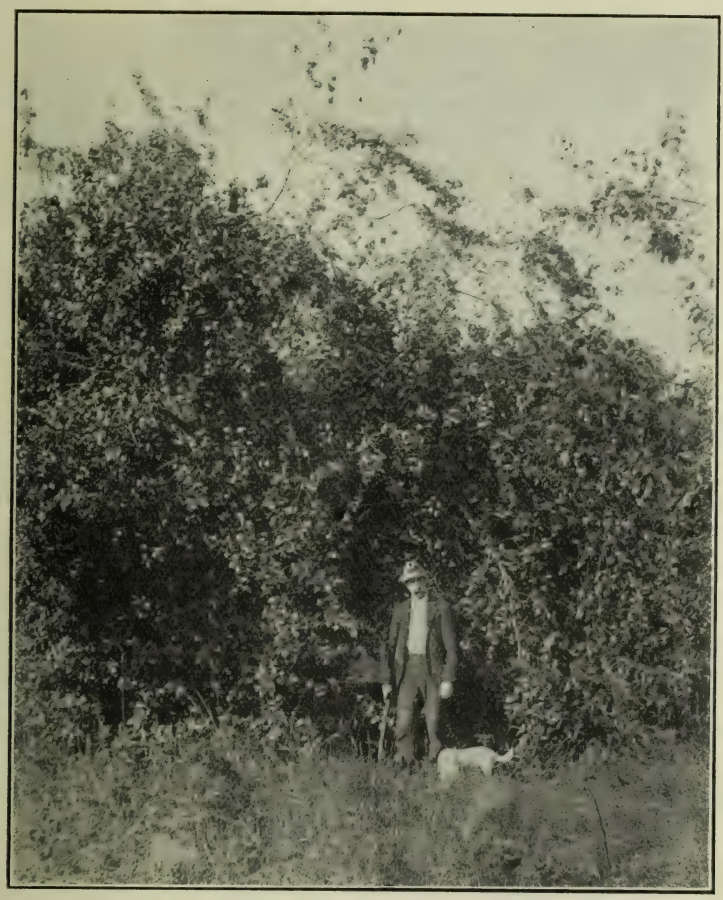
Palouse: Planted 1897, tree lacks vigor and is suffering from sun scald and canker, not desirable, no fruit.

Parlin's Beauty: Planted 1898, tree vigorous and hardy, forming a close compact head, fruit large and handsome, comes into bearing slowly but is worth further trial.

ROME BEAUTY: Planted 1898. Tree healthy and vigorous; fruit large and attractive; comes into bearing slowly; worthy of further trial.

SHIAWASSEE: Top grafted 1904. A slender vigorous grower, hardy to the tips; fruit somewhat larger than Fameuse and more oblate; not so subject to spot; flavor of good character. Evidently of Fameuse type, and well worthy of extended trial.

SUTTON'S BEAUTY: Planted 1896. A weak growing tree subject to canker and sun scald; dying off from year to year. Not desirable and not hardy.



The best Fameuse apple tree in the orchard of Mr. Harold Jones, Maitland, Ont., from which he is selecting scions to top work all the trees in his new orchard.

SCARLET CRANBERRY: A slow, weak grower, subject to sun scald and canker. Not desirable.

WINDSOR CHIEF: Planted 1896. At one time this variety gave promise of being a valuable winter apple for the province of Quebec, but in 1903-4 the trees were nearly all killed in that Province. The three trees I have planted have shown moderate vigor, and are keeping fairly healthy, but slow to come into bearing. Worthy of further trial on account of its value as a winter apple.

WISMER DESSERT: Top grafted 1901. Vigorous, fairly hardy, showing some canker at the crotch of the main limbs; fruit $2\frac{1}{2}$ to $2\frac{3}{4}$; attractive;

quality first class; a promising variety; season December to February 1st, after which date it begins to break down and lose character. Promising.

The only two profitable late winter apples that we have at present are the Scott Winter and Milwaukee, which two varieties are, properly speaking, only cooking varieties.

It is my desire to conduct a test on some of the best crosses made by Mr. Macoun between the McIntosh and Lawver, Swazie Pomme Grise and Scott Winter, and possibly other crosses, hoping to live to see a profitable, valuable winter apple grown in the St. Lawrence Valley.

Golden Russet and Yellow Bellflower: Are the two best late winter apples we have for dessert purposes but are not profitable varieties to grow owing to lack of productiveness. If we could get an apple with some color and the quality of Bellflower it would be a bonanza for the St. Lawrence Valley.

Pears.

Thirty-nine varieties of pears have been tested, most of them proving too tender for this climate.

Flemish Beauty has proved fairly hardy, giving fair crops of good fruit. For the best results it should be grown in sod and mulched, when grown under high cultivation the tree suffers from blight and sun scald, but in sod it is quite free from these diseases. The fruit is subject to spot which can be controlled by careful spraying.

Clapp's Favorite is not quite so hardy as Flemish, but gave fairly good results in favorable seasons. The fruit bud is tender, and is often destroyed during the quick changes of temperature during March and April. The tree is short lived here, dying off gradually from sun scald and blight, and cannot be depended upon to live more than ten years.

Ritson is quite as hardy as Flemish Beauty in tree, but not quite so hardy in fruit bud; will give fair results on a northern exposure.

These three varieties in favorable seasons will give the grower fruit from August to November.

Bessemianka and Victoria are two Russian pears very hardy, but the fruit is of such poor quality that it is not advisable to plant them, except as a stock to top graft on.

The three pears mentioned above are not by any means ironclads, in fact the trees of all three varieties are dying off at from six to ten years of age and have to be replanted frequently to keep the varieties on record.

I have a pear here that has been giving annual crops for more than one hundred years on this old homestead. The fruit is similar in shape to Giffard, color bright yellow, flesh yellowish white, texture fine, somewhat dry, flavor very mild sub-acid, quality, first class for cooking; value first class for home market being in demand in preference to any pears on the market for cooking purposes. I have never sold for less than 40 cents per basket and often 60 cents. Consumers who know the pear will have nothing else for perserving if I can supply the orders.

As this pear is an annual bearer, and has proved to be as hardy as the Fameuse apple in this section, I have thought that possibly the quality of the pear might be improved by hybridizing with seeming hardy varieties such as Flemish, Clapp's and Clairgeau. The result of such crosses may lead to the production of a valuable hardy pear, that could be grown with satisfaction and profit in the St. Lawrence Valley.

I mention this pear particularly on account of its fineness of texture and hardiness, as it may lead to growing a very desirable fruit over a very much larger extent of Ontario than at present.

The tree has been propagated by suckers and distributed in this immediate vicinity.

Cherries.

The cherry crop has been more satisfactory this season than for many years past. The trees were free from aphis and the rot did not show. Orel, Montmorency and E. Morello were the heaviest croppers.

Orel has proved to be the hardiest in fruit bud of any variety yet tested, but is not equal in size or quality to Montmorency or E. Morello. The trees bore a full crop this year.

Montmorency gave a full crop of beautiful fruit. The tree is proving quite hardy, but the fruit buds are too tender to expect an annual crop with any degree of certainty.

English Morello gave a full crop. Tree healthy and vigorous; fruit buds hardier than Montmorency, but suffer from extremes of temperature in March and April.

Early Richmond gave a fair crop tree not quite so vigorous as E. Morello but seems quite as hardy.

Ostheim: A hardy vigorous tree but a very shy bearer with me. It has never borne a full crop of fruit even in favorable years when less hardy varieties are loaded heavily.

Olivet is both tender in wood and fruit bud, and should be classed as undesirable.

May Duke: Tender in bud, undesirable.

Vladimir: Hardy, but a shy bearer and undesirable, on account of its poor size and quality.

Orel, E. Morello, Montmorency, Early Richmond are desirable varieties to plant with a reasonable expectation of securing a crop in favorable years.

Plums.

The Japan plums under test are practically all gone. Red June, Ogon and Maru have lived for some years, but never gave more than a few specimens.

In European varieties I have Glass Seedling and Dunlop's No. 53 and 54 in a healthy vigorous condition, but they have not fruited yet.

Of the several varieties of Americanas sent me for planting the Hammer has proved the most prolific and hardy. Many of the varieties sent me were not true to name and proved in many cases less valuable than fence corner varieties.

After testing almost sixty varieties of plums of European origin and finding nearly all of them tender in wood and bud, our main dependence, (for the present, at least) must be on the Americana and Nigra plums.

Of this class some very desirable varieties are being grown, and it is my present intention to proceed with the testing of the Seedling European plums originated on the Island of Montreal and to test thoroughly the merits of the best of the Americanas.

Gooseberries.

The gooseberry crop was everything that could be desired this year.

Downing gave a full crop but the fruit ran a little small.

Golden Prolific: A moderate bearer, but fruit of very large size and fine quality; a very desirable variety to plant, no mildew.

Champion: A vigorous grower and heavy yielder, fruit no larger than Downing, but easier harvested; a desirable variety.

Houghton: A vigorous grower and heavy yielder, but too small.

Whitesmith: Does not succeed well with me; fruit does not come to maturity; in size or flavor not to be compared with Golden Prolific.

Currants.

Cherry: One of the most desirable currants in cultivation, a strong grower and productive, easily harvested and sells well on the market.

Fay: A moderate grower, with weak wood that breaks down badly with the snow, the berry is large, but the bunch is not as long as cherry. It has not been a profitable currant with me.

Pomona: Moderately vigorous, growing a very thick bush that requires severe pruning annually to bring the fruit to size; quality good.

Prince Albert: A strong, upright bush, with dark, large foliage; subject to attack by aphis; fairly productive; fruit very acid; season late.

Raby Castle and Versaillaise very productive, but fruit is too small.

Black Victoria: A strong, vigorous grower, fruit large and sweet; crop only medium in quantity.

Lee's Prolific: A moderately strong grower and fairly productive, a desirable variety.

Naples: An old standard that holds its own against all comers.

Raspberries.

Columbia, Conrath, Cumberland and Turner have proved too tender for this climate without winter protection.

Older: Has proved hardier, and gives a fair yield, but it has the bad habit of sprawling all over the ground, which makes it hard to manage.

Herbert: Planted 1906; came through last winter without any injury, and had a little fruit this summer. Possibly this variety will fill a long felt want in this section.

ALGOMA FRUIT EXPERIMENT STATION.

By Chas. Young, Richard's Landing.

The season of 1907 has been in many respects a peculiar one. Early in March there was every appearance of spring; a bright, warm sun during the day with the thermometer going well up to 70°. This continued for about two weeks. Buds were showing green on the fruit trees. This was followed in April by a hard frost, thermometer down to zero one night, finishing up with a snow storm on the 27th of May. Taken all together, the spring was very backward, the worst I have experienced in twenty-five years. This, together with the poor vitality of many of the orchards since the winter of 1903-04, has been the cause of more loss of fruit trees in this district than ever occurred in any one year before.

Cherry trees suffered more severely than any other fruit trees. Perhaps three-quarters are entirely killed, at least down to the ground level. Sun scald played havoc with the apples and pears; protecting the trunk only protected that portion of the tree; the top, in many instances was killed. I

notice that orchards protected on the north and west and fully exposed to the sun or on a southern slope, suffered most, while those with a full north or northwestern exposure, especially if on high land, were comparatively uninjured. Many varieties of apples that have been successfully grown for years, are now nearly all gone. Such kinds as Mann, Tolman, Golden Russet, Ontario, Wagener, etc., have just proved a little too tender. Still, with the exception of Ontario, those mentioned have been grown successfully to my knowledge for twenty or more years, and if more attention is given to site, low heads, and trunk protection for some years, I do not see any reason why they may not be tried again, as they are all winter varieties, and we have nothing, so far, to fill their place. Many new varieties are being tested at this station that are not yet in bearing; but, so far, they promise to be hardy, as far as the tree is concerned.

I would caution any grower north or west of the Georgian Bay to carefully disobey the repeated advice given by good authorities to top graft on Tolman stock. This may be, and undoubtedly is, sound advice to those living two or three hundred miles to the south of us, but the Tolman is not sufficiently hardy here, while Longfield I have found to be good. I have lost several trees this way; and when we find the top sound and the Tolman stock killed, it is sufficient proof that that stock was not hardy enough. While I do not believe that any stock will impart an extra hardiness, that is, so far as its frost-resisting power of the scion is concerned, still it is not only desirable, but imperative that the stock should be as far as possible able to resist extreme, low temperature in winter, and the bright warm days in spring followed by sharp frost at night.

Of fall apples we have enough and to spare, and think it would not be advisable to multiply them any more. It would be very hard to find an apple to take the place of Yellow Transparent, Charlamoff, Duchess, and Wealthy. These, I believe, we grow to better perfection than in the more favored districts, and they give us fruit from the beginning of September until the beginning of April.

There is an apple I would mention which has always done well with me, *viz.*, White Astrachan. I have never recommended this apple, perhaps for the reason that Thomas, in the "American Fruit Culturist," classes it as rather dry and of little value. All the same, the original trees, which I planted twenty-five years ago, all lived, and this apple has brought me more money and filled more barrels per tree than any other, excepting perhaps the Duchess. It has just one fault; the fruit has to be carefully handled.

I think our nurserymen should propagate more of the Charlamoff for the far north. It is the very hardiest apple I know, and although its season is short, it will thrive under almost any circumstances, and a measure of success with a beginner will lead to more extensive planting later on.

All soils are not alike suitable for fruit growing. Much of the land in the newer portion of Ontario consists of flat, stiff clay, impervious to water. This is to be avoided if possible. As a rule land on which maple and basswood grow, will be found well adapted for this purpose. On the other hand, that timbered with spruce and balsam will be found unsuitable, although after a few years in grain crop and exposure to sun and well ridged up, a fair measure of success may be attained. The best and thriftiest orchards I know of are upon soil somewhat inclined to gravel with a porous clay subsoil and a northern exposure. This is imperative on ground elevated above the rest of the field. I have a case in my mind of a rather extensive orchard planted on low rich ground, well protected on all sides. It has been carefully cultivated for some years, well protected from cold winds, well

manured, and the result a failure. Not ten per cent. of the trees originally planted are alive and healthy, while further along the road, another, planted on a hillside and not getting as much care, is very promising, and it is also noticeable that the further up the hill, the better the trees look.

Chas. Young's experimental apple orchard at Richard's Landing, St. Joseph Island, Algoma.

"Plant stock grown in your locality" may be a very good principle to go by, but I would caution those buying stock grown in the north that for some years past a large proportion has black heart, and unless one can make a personal selection in the nursery, or have the privilege of examination when delivered, I would prefer that grown in the southern part of Ontario. Certainly northern stock would be preferable if healthy, for it is usually better rooted. Twenty-five years' experience has taught us that trees as sent out are usually headed far too high, at least for the north, and I would strongly recommend to those who contemplate planting extensively to set out two-year old trees and form the head, say two feet or less from the ground, unless of a spreading habit, such as Longfield among apples or Burbank among plums, which may be of the usual height.

Winter protection of the trunk and lower portion of the top is necessary for some years. I find the advice to use a thin veneer of little use. The veneer, at most, protects only the trunk and leaves the collar exposed, and this is the vital part of the tree. If not very severely scalded the trunk will get all right again; but, if the collar of the tree is injured to the same extent, the tree is killed unless a new head is formed below the injured portion. I have tried many different protectors, such as barrel staves, basswood bark, building paper, etc., but have found nothing more effective than a strip of burlap or any old sacking wound round the trunk and lower portion of the top. This entails a good deal of work when there are many trees to go over, and a simpler and possibly just as effective a method is to make up some lime whitewash, have it about the consistency of plasterer's putty, when

it is run off. Throw a handful or two of fine sand or wood ashes into the pail, stir it up and apply with an old broom or whitewash brush, lay it on good and thick about the collar of the tree. I have found this a perfect protection from sun scald, besides being of benefit to the tree otherwise.

Now, a word as to the debatable question of cultivation. After the orchard has been in bearing for many years I have paid careful attention to this, and at last I have come to the conclusion that so far as we are concerned in Algoma, an orchard in bearing, seeded down with clover, will produce more and better fruit and with much less work than if cultivated. We do not need surface cultivation here to conserve the moisture. We have usually enough of that and to spare.

In an apple orchard I would prefer, when trees come into bearing, to seed down with clover. This will last for many years and when June grass begins to crowd the clover out, break up and seed down again.

Does Fruit Growing Pay in Algoma?

Now, to sum up the question, I answer without any hesitation,—Yes; and better than any other soil production. I have had some experience in Eastern Ontario, and a good many years in Algoma, and can affirm that small fruits and apples pay well, better even than farther east. The price we can obtain, (many thanks to the excessive charges of the transportation company) are much better than in the Toronto markets. In addition to the advantage of selling largely direct to the consumer, our summer and fall fruits have better keeping qualities and are of a higher flavor than those grown in the southern countries. If money is the sole object, pears, plums, and grapes had better be left alone, at least in the meantime.

Now, to sum up with a few general remarks. First as to location: Select if at all possible, a site for the orchard elevated above the surrounding part of the field, and naturally dry or underdrained. Light sand or stiff clay is to be avoided, although by careful handling the clay may be made all right. A slope ranging from east to west is desirable, but I would avoid a southern slope unless it faces a large body of water. Protection from wind, etc., is desirable, but I would prefer it fifty yards away. See that the stock is healthy and well supplied with fibrous root growth. Plant two year old stock, and, as a general rule, bed low. Give clean cultivation until bearing. Do not prune quite so close as is thought necessary farther south; 30 feet between the rows and 25 feet in the row will be found to be about right. Do not fail to protect the trunk and lower portion of the branches from sun scald and avoid extensive manuring.

Apples.

Fairly good success has been had with the hardiest varieties in this district, and a noticeable advancement has been made during the last five years. Formerly not enough apples were grown for home use. Now during the months of September and October they are largely exported to Sault Ste. Marie and other points by daily boat, giving excellent service at one-half the rate charged by rail. Fall and early winter varieties are mostly grown, Duchess, North Star, Alexander, etc., principally. Crab apples this year have been an enormous crop and of excellent quality and appearance. There is no use in eastern growers sending crab apples here, as we can grow them to far better perfection than they can. The same may be said regard-

ing summer and fall fruit, only in these we do not yet grow enough to supply the demand, although home grown Duchess or Alexander will bring 50c. a barrel more than those imported, principally on account of their better keeping qualities.

Our market here calls for a rather large apple, such as Wolf River. This will sell in preference to McIntosh, and other apples of better quality, but one which I hesitate to recommend on account of its tendency to scab. It is only in late years that this has given any trouble; but this fungus is gradually getting worse, especially in the Snow class, and in order to obtain clean fruit now we must spray at least twice a season, or oftener with Snows. Codling worm has not troubled us yet, but oyster shell bark lice are bad and getting worse, through neglecting the trees. We have nothing yet to take the place of your finer winter varieties, such as Spy, King, etc.; that is, nothing hardy enough to be depended on. Several are under test, such as Milwaukee and others from which we may obtain what we are looking for, an apple that will keep into spring.

Scott Winter, from which we expected better results, will have to be put into the undesirable class. The fruit with us runs too small in size after the tree is into full bearing. It is not productive and for a late winter apple will not compete with an eastern grown Spy, besides the tree is not altogether hardy. You will see that most of our apples, partake,—if I may use the expression,— largely of Russian blood, and all have one noticeable defect, that of dropping their fruit when nearly ripe. This, which in the old apple districts would be a serious fault, cuts very little figure here, as by keeping the orchard in grass and gathering the fallen fruit regularly, we can always dispose of it at the same price.

For varieties recommended see page 94.

A list of varieties of apples not considered worth further cultivation in the district represented by the Algoma Fruit Station: Spy, King, Baldwin, Tolman, Blenheim Orange, Rolf, Sweet Bough, Ben Davis, Stark, Bismarck, Mann, Rhode Island Greening, Fourth of July, Early Harvest, Lady.

Cherries.

This has been a hard year on cherries. I have always considered that a rather light, sandy soil was best adapted for this fruit. My first trees I planted on just such soil and but few healthy trees remain, while those planted on rather stiff, red clay are practically all healthy and carry a fairly good crop. This year has been the poorest on record, which is to be accounted for by the unfavorable spring. If we can keep the trees, alive, we can always count on a fair to good crop of cherries within a limited distance of lake influence. I don't think we will ever see the magnificent specimens of trees to be met with in parts of Old Ontario. All I have seen bear evidence of early decay, nevertheless, if grown near any large body of water, cherries are a paying crop. I can see no difference in the hardiness of the different varieties. Orel and Montmorency are perhaps the best two I have grown, but Richmond, Montmorency and English Morello will fill out in season. It is little use trying sweet cherries; under the most favorable conditions it will only result in failure. The difficulty is the bursting of the bark on the trunk of the tree. This may be obviated by heading the trees nearer the ground. No black knot so far has troubled us. I have never protected the trunk of the trees during winter which may partly account for any loss by frost bursting the bark.

Desirable, (named in order of ripening): Richmond, Montmorency, English Morello.

Plums.

As a rule cannot be said to be much of a success. A few years ago I would have advised anyone in planting plums to plant Japans. Now I would say, "Go slow with them." I was much gratified the first few years in the remarkable growth they made, the fine healthy foliage, etc., but when they came into bearing I found they were not in it—plenty of blossom, but little fruit, and that, as a rule, of inferior quality.

They are not all to be condemned. Burbank is a good plum, so is Red June, but the last is not quite hardy here. Wickson is decidedly tender. A selection containing some of the Japans along with Glass Seedling, Lombard, and Reine Claude, would be better for those looking for quality, but those looking for fruit every year and abundance of it, will have to content themselves with the Americanas. They have some faults; the best of them are late in ripening, and occasionally they may get caught with a sharp frost in the late fall; the skin is tough and the wood is brittle, it is no unusual thing for half of the top to break off carrying the fruit with it; but their growth is vigorous, and they soon recover the damage and make very good preserves. I think we may reasonably look for an improvement in this class soon, or if someone would visit our wild plum growing along the streams in the north, sample them, and propagate from the best, we might reasonably expect an improvement in plums for the north. As a matter of fact a wild plum of a superior quality for eating out of hand would not be difficult to get, but from a commercial standpoint they would not be saleable, because, you see, they are wild plums.

Pears.

From a commercial standpoint, pears have not been a success at this station. I am not prepared to say what is hardy. The Anjou is a very fine pear, but supposed to be somewhat tender. So far, it has done as well or better than Flemish Beauty. I have several under test, mostly Russian, but not into bearing yet, with the exception of a few not worth growing. I would not care to give a list of varieties recommended or to advise planting pears extensively.

Grapes.

A few varieties can always be depended upon for pleasure if not for profit. Southern grown grapes can be had so much better and cheaper than we can grow them that there is no money in them. Still, a few vines grown near the house, produce an effect which is desirable, and it is not well just to confine our energies to the money side of the matter. I would say plant a few vines of Moore's Early, Green Mountain, Janesville, or Champion. If care is to be given, plant Delaware, but there is an occasional season when it will not ripen.

Strawberries.

These have always been a satisfactory crop at this station and bring remunerative prices. I have never yet been able to supply the local demand

for good fresh berries. I do not cover in the fall, but find the snow a sufficient protection and seldom take more than one crop off the ground. I plant in rows four feet apart by two feet in the row and find in most varieties the plants sufficiently close. A late berry is desirable here as the market is fully supplied with early fruit from the south, but our firm, fresh fruit is always in demand locally.

Among the many questions asked at this station, none are so general as: "What is the best berry to plant?" and "What can be made off an acre?" Neither of these questions do I care to answer; the first because I don't know. For a few years, Clyde was my best berry; lately it has gone back. Then Haverland took the first place, but when ripening, a few days of hot, drying wind will greatly reduce the crop. Last season, Bubach was much the best. As to how much may be made off an acre, if I were to tell, the half of those who ask the question would not believe me; besides, it largely depends on the man growing them.

Among the many varieties tried here, only a few have been unsatisfactory. Saunders and Williams have green tips. Parson's Beauty has comparatively few runners.

Splendid, Glen Mary, Tennessee, Haverland, Bubach are all good.

Currants.

If there is any one fruit we excel in, it is this. They grow to perfection almost anywhere if given shallow cultivation and plenty of manure. Among the many varieties, I can see but little difference. Some have larger individual berries, but fewer bunches. Others again lack somewhat in quality. There is no fruit which gives us less trouble to grow, and no fruit that we can so certainly depend on for a crop. They always command a readv sale locally. Either red or black bring remunerative prices and anyone who wants to grow fruit with little trouble had better confine himself to currants. Although so easily grown, it will be years yet before the local demand can be filled with choice fruit, for although early grown, they will respond readily to good care and the fruit be much larger. Take the old Red Dutch, top dress heavily in the fall with well rotted manure. Cultivate lightly in the spring and watch for results, always taking care to keep the supply of young wood up and not allowing the bark to get too thick in the center, especially the newer black varieties, such as Champion, Saunders, etc.

Recommended. For quality: Red Dutch. For profit: Champion, Saunders for black; Fay and Versaillaise for red; and White Grape.

Raspberries.

The yield of Loudons was very good. Cuthbert was a complete failure; the canes were all frozen. Marlboro gave about half a crop of large berries. Brinckle's Orange was frozen to within two feet of the ground, bore a fair crop of excellent fruit. The canes of this variety lack vigor; the fruit is superior, but too soft for shipping; only of value for home use. The Caps are little or no use here. This is not a profitable crop to grow for sale; wildberries are so plentiful, and, for preserving, people prefer them. Coming in after strawberries they fill up a blank in the season, but the demand is limited.

Gooseberries.

This crop was the largest I have ever grown here. Several newer varieties that I am particularly well pleased with have fruited for the first time. Among these I may mention Golden Prolific, the bushes of which were literally covered with large, handsome berries. Red Jacket came next in productiveness, followed up by Industry. This is the first year in which I can say that the English berries outyielded our American berries. We have never been troubled with mildew here, and this season, did not need to spray for the currant worm.

Gooseberries, after strawberries, are perhaps our best paying crop.

Recommended: Pearl, Downing, Golden Prolific, Red Jacket.

THE STRAWBERRY EXPERIMENT STATION.

By Rev. E. B. Stevenson, Guelph.

General Notes.

The season of 1907 was in some respects a remarkable one. Coming on so late, we began to feel that there was going to be a total failure. Almost everywhere it has been acknowledged that the season of 1907 taken along with the later part of the growing season of the previous year was one of the most discouraging, perhaps, that we ever experienced, not only in the strawberry domain, but in the entire fruit industry.

The season was very slow in opening. A warm week in March was followed by cold in April and May. Frost almost every night in April. May was cold, up to the 27th, snowing, sleet and rain on that day. The first part of June was cloudy and cool; east wind a good deal of the time, very discouraging to the bees, so that we began to fear that the few blossoms that were so slow in opening would not be fertilized as it was too cool and cloudy for the bees to work; but finally things came on with a rush, all varieties in a heap fruiting together. It was a somewhat unusual thing to see some of the late ones ripening with the early and medium varieties, *viz.*, Gandy and Aroma ripening with Tennessee, Prolific and other early medium kinds. The bees could not work at the time work was most needed and, as a consequence, we had a good many imperfectly fertilized berries—nubbins—but the best of the crop was as fine as I ever saw, so large and fine that it was a delight to look on the fine full boxes ready for market. I have heard some people say that it does not pay to grow these big beauties. They say you can grow a basket of small berries in matted rows for less money, and for the ordinary market. Perhaps they are right, but, if you are near or can reach a fancy market, there is not the least question about the profit of big berries. One storekeeper took all my best berries. I could not supply him with all he wanted. He said, "Why, these berries are an advertisement to my store, every box of them. I can sell these big fellows where I cannot sell the smaller ones. Some of the stores can sell the poor stuff that some growers bring in, but I do not want it. I have customers for all these big berries you can bring me." He paid me 15 cents a box by the crate. He took them all; I never had enough for him, and in case of a glut in the market these beauties will sell where the smaller ones could hardly be given away. I remember one Saturday evening I took down some

of these big ones. When I got to the dealer, another grower had just driven up with a lot of the common kind. The store-keeper did not want any of them. As I listened, I thought I would for once have to take them home, but as soon as he saw me he said, "Mr. S., I will take your berries, as I know they are all extra fine, and I can sell them all this evening." He took them, and gave me 15 cents a box, when he did not want the common kind at all. Of course these *big ones* mean more work in the field in the cultivation, etc. You cannot grow these bouncers without work, a good deal of finger work and backache. Another thing, you must be careful in the picking of them after you have grown them. I have found that some pickers spoil a good job in the picking. They take hold of the berry and pull at it till it comes off the stem. Nine times out of ten the berry is bruised and mashed somewhat and you can never afterward get it to make a fine appearance; or they will hold two or three berries in the hand and try to pull others, thus mashing all of them, or the berry comes off the hull and never will look well. I instruct my pickers to let the berry alone; to take hold of the stem of the berry, and then if the berry is ripe to pick off the stem with the thumb and first finger nails, leaving enough of the stem to handle the berry by, without touching it. There are pickers who will go this far all right, and then throw the berry some distance into the box. I will not have any of that after a fair trial. I have no use for such pickers. I want my berries handled with the greatest care. The glory of picking and handling these fine berries compensates for the finger and backache required in keeping the plants clean.

I have not yet succeeded in growing your ounce berries, or 12 berries to a box.

My Method of Cultivation. The ground taken has been for two or three years given up to roots to avoid the white grubs which are found in quantity often in sod or newly broken or grass land. I manure freely, with as well rotted stable manure as I can get, plowed and well worked with harrow. The rows are 3½ to 4 feet apart and plants 2 feet apart in row. Cut off all blossoms and cultivate once a week to keep clear of all weeds. If you have some well rotted manure to work in as you cultivate, it is a good thing and will repay in the fall, after growth has stopped and the ground is frozen, to give the plot a mulch of pea-straw. This mulch I have found to be the best, does not lie so flat as wheat or oat straw, it holds the snow better than either of the other kinds. In spring this mulch is raked into the paths where it helps to hold the moisture in the ground and keeps the berries clean.

Fall Bearing Varieties.

For some time there has been a good deal said about certain varieties that were claimed to bear a good crop in the fall season, and it was said they were as good as the spring varieties and were more profitable. The most lauded of these fall bearers, perhaps, is one called Pan American, a sport of the Bismark. Three years ago I sent for plants of the Pan American. I have been growing it since, and as the result of my experience, I would not advise anyone going into the growing of the so-called fall bearing strawberries for profit. On this subject I would say that I have found than any of the old varieties will bear berries in the fall under certain conditions, and the conditions, some of them at least, are: If the spring is cold, wet and long, followed by a season of drought, then in the latter part of August or early September if you have a good deal of rain, you can look out for fall straw-

berries. We had berries all through July, while usually the season ends with June. You may pinch off the blossoms and later on in late September or early October you will have a few berries of any kind so treated. But what kind are they? Just like any berry or fruit out of its season. They do not taste like, nor have they the aroma or flavor of, the spring grown strawberry. Sometimes they are of fair size, but they are sour or insipid, and you do not want to eat more than one, at most two of them. I would like to ask how much money a man would make in cutting off all spring set blossoms and waiting for fall berries. I would say none at all, for by the time he would get through taking off all the bloom, he would find another crop. There are sorts that will send up a third or even fourth fruit bud after the first have been cut off. I noticed this the past summer in the 3 W's. In spring set plants they kept blooming and ripening some fine berries all through the summer, but the berries were inferior in quality to the spring ones. From my experience, I would say that the fall growing of strawberries for profit is a failure and a fraud, and would not recommend anyone to try it.

The season of 1907 was between two and three weeks late. It was almost July before any quantity was ripe. We picked until the 25th of July, a few scattered ones after that time. The last picking of Yant, Hummer, Hundred Dollar, Arnout, Woolverton, Joe, Minuteman, Wonder, Cardinal, New York, Three W's, Glen Mary, Brandywine, Aroma, was on the 15th of July and sold for 15c per box.

Among the newer kinds that were very promising I may mention the following: The Hummer, Hundred Dollar, Arnouts, Beidler, Jacoma, Abundance, King Edward, Virginia, Oak's Early, McNeil, Chesapeake, Stevens Late Champion, and Ekey.

Among the older kinds, the best were: President, Joe, Three W's, Minuteman, Pocomoke, Kitty Rice, Bismarck, Uncle Sam, Wonder, Howard's No. 3, Auto, Early Hathaway, Ernie, Ben Davis, Commonwealth Mead, Cardinal (must be well fertilized), Heflin's Early, Early Beauty. The old standards made good their place as worthy of a first place, they are: Sample, Haverland, Splendid, Glen Mary, Parson's Beauty, Ruby Tennessee Prolific, Williams, Brandywine, Warfield, Latest, Senator Dunlap, Bubach, Beder Wood, Margaret, Marshall, Ridgeway, Success, Van Deman, Wm. Belt, Woolverton, etc.

List of Varieties in Alphabetical Order.

Arnout (Perfect): Sent out by J. L. Arnout of the Keystone State in 1906. Plant healthy, strong grower, good runner and productive. Berry large, conical, bright, scarlet, yellow seeds; flesh white and pink, medium in firmness, medium to late season. A good one, worth a trial.

Abundance (Perfect): Sent me by S. Woodruff & Sons, of New York. Plant strong, healthy grower and a good plant maker, quite productive. Berry bright scarlet with yellow seeds, conical, of medium firmness, good quality, medium to late. Worth a trial.

Advance (Perfect). Introduced by A. B. Printz of Ind., 1903. Plant good grower, light yellowish green foliage. Did not do very well. Will give it further trial.

Abingdon (Perfect): From L. Blanchard of Mass. Plant strong grower, healthy and large. Not so productive as last year. Berry large, roundly conical, crimson and red seeds, medium in firmness, good quality. Late; some of first berries irregular.

ALMO (Imperfect): Chance seedling by J. Bauer of Ark. Plant strong and healthy. Berry medium to large, dark red. Plant productive.

AUTO (Perfect): Came from Maryland. Plant is healthy and strong grower. Productive. Berry is very large, dark scarlet in color with yellow seeds, round in shape, flesh red; medium firm; fine flavor. A good one.

ARMSTRONG (Perfect): Indentical with New York, Corsican, Maximus, and Uncle Jim. The plant is healthy, large and strong, medium in productiveness. The berry is large to very large and fair flavor. A good one for amateurs to plant.

AUGUST LUTHER (Perfect): Plant small but healthy. Fair runner, medium productive. Does well in some places. Early. Medium in size.

ANNIE HUBACH (Perfect): Sent me by the originators, H. & H. of Ark. The plant is a good grower, healthy, light green color, productive. The berry is medium to large, bright scarlet with yellow seeds. Hollow, flesh pink, medium quality, and medium in season.

ALICE HATHAWAY (Perfect): Sent me by the originators H. & H. of Ark. The plant is healthy. Makes plants freely and productive. The berry is medium to small in size but good quality.

AROMA (Perfect): An old standard—one of the late sorts. The plant is dark in foliage, healthy: The berry is large, roundish, same season as the Gandy. Widely grown, as best late.

BEAVER (Perfect): Sent out by M. Crawford of Ohio. The plant is small and lies close to the ground, a fair grower. After a fair trial, I have decided to drop this. It is too small and not productive.

BUSTER (Imperfect): Sent me by the originator, C. C. Stone of Ill. The plant is strong and healthy, a good grower. Large and dark green foliage. No rust. The berry is large, pinkish in color medium in firmness, productive, fair in quality, season late. Will do for nearby market.

BEIDLER (Imperfect): Plant strong grower and healthy; vigorous and productive. Berry is large with a neck, bright scarlet with yellow seeds, solid, flesh red and firm, good quality. A good one.

BEAVERS (Perfect): Not the BEAVER. Sent me by M. Crawford of Ohio. Plant a good grower. Did not do well with me. Will give a further trial.

BEN DAVIS (Perfect): Plant is a good grower, healthy and productive. Berry large, roundly conical, scarlet, flesh firm, solid. A good quality and flavor.

BASTON PRIZE (Imperfect): Plant a good grower, healthy and productive. Berry is large and conical, pale scarlet pink. Berry too soft. Not desirable; will drop it.

BEDER WOOD (Perfect): One of the best early kinds. Well known.

BUBACH (Imperfect): An old standard which still maintains its place

BISMARCK (Perfect): So well known it needs no description. It did well the past year with me.

BRANDYWINE (Perfect): One of the best late varieties. Well known. Needs no further description. Did well this season with us.

CHESAPEAKE (Perfect): Originated 1903 on Chesapeake Bay by J. W. Parks of Wicomico Co., Md., and introduced by W. F. Allen in 1906. The plant is very large, with thick leathery leaves. Healthy, fair runner, medium productive. The berry is large, round with a nose. Bright, glossy, scarlet, resembles Bismark. Yellow seeds, solid. Flesh white and pink, firm. Worth a trial.

COMMANDER (Perfect): Plant is large, healthy and strong. Had a few very large berries, but not enough. Will give further trial.

COMMONWEALTH (Perfect): Sent me from Massachusetts originated by W. H. Munroe. Plant is healthy, good grower and quite productive. Berry is large, conical, very firm, sweet and good quality. A good late. Will prove, I am sure, a good shipper. One of the latest, and so has a short season. Well worth a trial by all growers for far market.

CARDINAL (Imperfect): Sent me by originator, Mr. Streator of Ohio. The plant is healthy, strong, a good grower, but unless well fertilized, not productive enough. The berry is large, very firm, good flavor. Did not do as well this year as last, I think owing to the lack of sufficient pollen to fertilize the blossoms.

CLYDE (Perfect): One of the best known and widest grown. Very productive. The plant is failing in vigor, does not produce enough foliage. The berry is very large, light scarlet and good quality.

CATHARINE (Imperfect): Originated by J. F. Cannon. The plant is large, healthy, with thick broad foliage, quite productive, a good runner. Berry is large, roundish, conical, red to centre. Colors well all over. Medium in firmness. Good for near market. Did well.

CLIMAX (Perfect): Seedling of Bubach by Mr. Graham of Maryland Plant is healthy and productive. Berry large, scarlet and quite early.

CORSICAN (Perfect): Same as Armstrong.

CHALLENGE (Perfect): I have given this variety a good trial and have decided to let it go. It is not to be relied upon and so not profitable.

DUNCAN (Perfect): Sent me by M. Crawford. After two years' trial this variety has proved of no worth at all. Wonder why such worthless things are sent out.

E. H. EKEY (Perfect): A new one. Sent me by M. Crawford of Ohio. Plant a strong grower, productive. Berry is large, bright, glossy red with red seeds, solid and firm. Good quality but of short season. Two or three good pickings and it is over. Worth a trial for market.

EARLY HATHAWAY (Perfect): Sent me by the originator, Hathaway, of Ark. Plant a good grower, healthy. Runs freely. Plant somewhat tender, berry roundly conical, red all through the berry, fair quality medium to large, scarlet color, a good early.

EARLY MARKET (Perfect): Plant healthy. A good runner. Fairly productive berry scarlet, medium size, roundish in shape.

EARLY BEAUTY (Perfect): This one did well. Plant found in a field of crescent in Iowa. Introduced by M. Crawford who sent me plants of it two years ago. Plant is healthy, good plant maker, quite productive, berry roundish red, flesh red and but fair quality. Worth a trial.

ERNIE (Perfect): Plant is a good, strong grower, healthy, quite productive. Can only say it did well again, as last year; berry ripens early. Red color with yellow seeds, large size, round, a good medium early.

ELMA (Imperfect): Sent me by the originator, J. H. Black of N.J. Elma is a seedling of a cross of Nettie and Roblin, fertilized by Joe. The plant is healthy, strong grower and fairly productive. Berry is large, round in shape, a bright red color, flesh pink, medium in firmness. It is one of the latest. Worth a trial.

EMPEROR AND EMPRESS (Perfect): Originated by the late J. Little, Ontario. They resemble each other very much. Plant strong and healthy. Berry is large and fine quality. Look like the old Jessie very much.

FOUNTAIN (Perfect): Plant one of the most vigorous growers. Healthy and productive. The berry is a good size, conical, quite firm, a good dark scarlet color with yellow seeds, good flavor, a good shipper. Worth a trial by all growers.

Fairfield (Perfect): Plant healthy, good runner, fairly productive. The berry is large, red color, firm and good quality. It is early.

Florella (Perfect): This is a seedling of Bubach by Dr. Brown. The plant is healthy, a good grower, productive. Berry is large irregular, a good early. Did well the past season.

Great Ruby (Imperfect): Sent me by P. Henderson of New York. Plant a good strong grower, fine runner, healthy. The berry is dark crimson with yellow seeds; flesh red, firm, of good quality, medium in productiveness.

Gen. De Wet (Imperfect): This is a seedling of Bubach and Parker Earle, sent me by J. Kewitt of N. J. The plant is a large, strong grower, healthy, only medium in productiveness. The berry is quite large and fine looking. Medium firm and good color.

Glen Mary (Perfect): Plant is a strong grower, large, dark green foliage, widely grown. Berry large, irregular, dark red. Has done well wherever grown. A good market variety,—late.

Gandy (Perfect): A standard late. Well known. Did well.

Granville (Perfect): Supposed to be a seedling of Miner's prolific. The plant is large and healthy, a good grower. The berry is large, oblong, bright, shiny, red color. Flesh firm, white inside, fine flavor; medium to late, only medium in productiveness.

Greenville (Imperfect): Resembles the Bubach very much, though berry is not as large. Plant is a dark green, healthy, a good grower and quite productive, berry large, good bright red, medium in firmness. A good one for near market.

Hummer (Perfect): Sent me by W. F. Allen of Md., 1906. Well named. The plant is strong, healthy and good grower. Productive. The berry is large, bright scarlet, flesh, pink. Yellow seeds. Of good quality, firm, a good one. Worth a trial by all growers.

Hundred Dollar (Perfect): Sent me by W. Hathaway of Ohio. The plant is healthy, large, strong and vigorous grower. Quite productive. The berry is one of the largest, scarlet with red seeds. Roundly conical, flesh white and pink, mild good flavor, resembles Woolverton. A good one, worth trying.

Homeland (Imperfect): One of the standards. One of the most productive. It has been for a great many years at the front. It did well the past season. It has been widely grown; still the favorite with many. Its imperfect blossom is somewhat against it.

Heflin's Early (Imperfect): A good early sort. Plant is healthy, good grower. The berry is good size, good quality and firm; worth trying for market.

Howard's No. 3 (Perfect): Sent me by the originator, A. B. Howard, of Massachusetts. It is a seedling of Clyde. The plant is a rampant grower, healthy and very productive. The foliage is light like the Clyde. Berry is medium to large, firm, conical, bright scarlet, with yellow seeds of good quality. A good market kind, and when introduced will be worth trying by market growers.

Howard's No. 7 (Imperfect): Sent me by originator, Mr. Howard, of Massachusetts. This is a seedling of Haverland, crossed with Marshall. The plant is healthy, good grower, productive. The berry is conical in shape, good flavor and I think will prove valuable.

Howard's No. 103 (Imperfect): Sent me by the originator, Mr. Howard, of Massachusetts. This from a seedling of a seedling of a Crescent and Clyde cross. The plant is healthy, a good grower and quite productive. The berry is large, roundly conical, dark red and firm, seeds somewhat

imbedded and early. I believe when introduced will prove a good market variety.

Howard (Perfect): Sent me by originator, J. H. Black, of New Jersey. Grown from seed of Burton's Eclipse, fertilized with Gandy. The plant is large, strong, healthy, of very dark green foliage. Berry is a good size, dark red, quite firm. Season late.

Howard's No. 2 (Imperfect): Sent me by son of originator, the late G. W. Howard, of Michigan. The plant is small but a good runner, has some rust on it, but quite productive. The berry is a fair size, roundish, solid, pink flesh, good quality, medium in firmness. Did well with me this year.

Howard's No. 96 (Perfect): Originated by same grower as the last variety described,—the late G. W. Howard of Michigan. The plant is quite healthy, makes plants freely and quite productive. The berry is medium to large, dark scarlet in color, roundish. Flesh red all through. Solid, firm and fine quality.

Ham (Perfect): Sent me by the originator, J. H. Black of New Jersey. This is a seedling of Mary and Parker Earle. Plant resembles Mary; is a good grower, strong and healthy, very dark green foliage; medium in productiveness, berry is large, dark red, flesh dark red; good flavor. Berry smooth and firm.

Irene (Imperfect): Sent me by the originator, Mr. Riehl. The plant is a good runner and plant maker, dark green foliage, plant not large. The berry is medium to large, conical, bright scarlet with yellow seeds. Berry has a cavity in centre. Of medium firmness and fair quality.

Ideal (Perfect): A seedling of Bubach and Hoffman by J. W. Kerr, of Maryland, in 1894, sent me by originator. The plant is healthy a good grower and fairly productive. This is its only weak point: the berry firm, of true conical shape. Bright scarlet color with yellow seeds, a beautiful looking berry; fair quality. The berries all look as if turned in a lathe, so regular are they.

Jacoma (Perfect): Sent me from Virginia. The plant is a good strong growing kind, runs freely and productive. The berry is large, glossy red, medium firmness, good quality. Will give further trial.

Joe (Perfect): A seedling sent out by J. H. Black of New Jersey. Mr. Black sent me plants some years ago, and it has always done well with me. The plant is healthy, a good grower and quite productive. The berry is a large bright scarlet, obtuse conical, quite uniform in size and shape; the quality is of the best. Season medium to late. Well worth trying.

Johnston's Early (Perfect): This variety never has done much with me. Only medium early. Sour and not productive enough. Is said to do well in some places and soils.

Jaggets (Perfect): I have given this a good trial. It has never done well with me and I do not hear of its doing well anywhere else, so will drop it.

King Edward (Perfect): Sent me by the originator, D. J. Miller, of Ohio, in the fall of 1906, so what I have to say will be from trial of fall set plants. The plant is very large, strong and healthy. Roots easily and makes runners freely. I should say, quite productive. The berry is large, roundish, solid, bright scarlet and red seeds. Flesh is white and best quality. It is very promising. I informed Mr. Miller that the name of our king was "Edward," and congratulated him in naming such a fine variety after our King Edward. He replied "I was not aware of that until I got your letter." Last spring I heard of another berry that had been called

"King Edward." It was sent me by a Mr. Crysler, of Galt, so now we have a "United States King Edward" and a "Canadian King Edward"—good long names. Neither of those originators seemed willing to change the name they had given to their offspring. Will have more to say about them after next year's fruiting.

KITTY RICE (Imperfect): This is a good one. Comes from Ohio. The plant is healthy, a good grower, makes plants freely, quite productive. The berry is large and fine, roundish, bright, glossy red, fair quality and firm. Makes a good show in the crate A good one; worth trying.

LATEST (Imperfect): Sent me by the originator, S. H. Warren of Massachusetts. The plant is healthy, strong grower. Does not make many plants but starts out quite productive. The berry is large, conical, crimson; flesh, red. Firm and good quality; one of the latest. Perhaps the most promising late variety. The berry is not perhaps as large as Nettie, but finer looking.

LOUIS HUBACH (Imperfect): Sent me by originator, Mr. Hubach, of Arkansas. Seedling of Warfield and Lady Thompson. The plant is healthy good grower and productive. The berry is bright, dark scarlet with yellow seeds, conical in shape. Flesh red all through and solid. Medium in firmness. Of fair quality.

LYON (Imperfect): Plant healthy and a good grower. Productive. The berry is dark glossy red, long pointed, with red seeds. Flesh red, fair size. Like the old Longfield of Dr. Stayman's days. Medium to late. Quality is good, and fine flavor.

LESTER LOVETT (Perfect): Very much like Gandy, both in plant and fruit and season.

MARK HANNA (Imperfect): A strong grower, healthy and fairly productive. The berry is quite large, of dark red color. Somewhat tough but of good color and fair quality. Would do for near market.

MRS. MARK HANNA (Perfect): Plant is strong grower, healthy, but has some rust. Produced some of the finest berries of good color but not very prolific.

MRS. MILLER (Imperfect): The plant is large and healthy. Not very productive. The berry is large, bright red; flesh, red. Oblong. Somewhat flattened and good quality. Season medium to late. Many better kinds.

MELLIE HUBACH (Imperfect): Sent me by the originators, Hathaway & Hubach, of Arkansas. The plant is healthy and a good grower and very productive. The berry is bright scarlet with yellow seeds, conical in shape, blunt at end, with a slight neck; flesh, pink and white at centre. Good flavor. Somewhat acid. Will prove a good market berry. Worth a trial.

MEAD (Perfect): Originated by H. O. Mead, Ex-President of Massachusetts Fruit Growers' Association, and sent me two years ago. It has proved a good one. The plant is strong and healthy. No sign of rust, a good runner. The foliage is dark green and quite productive. The berry is large, fine looking, roundish, coloring all over at same time, firm and good quality. Will take a front place.

MRS. FISHER (Imperfect): Sent me by the originator, J. H. Black. It is a seedling of Bubach and Sharpless. The plant is healthy, strong grower and productive. The berry is large to very large, a bright scarlet color, medium firm, good quality, late, valuable for near market.

MORNING STAR (Perfect): Did not prove very valuable after a fair trial. Will drop it.

May King (Perfect): Plant healthy. Good runner; quite productive; berry bright scarlet, but appears quite soft. Will give further trial.

Minute-Man (Imperfect): This has proved one of the best with me. It was sent me by M. Crawford two or three years ago. It is one of the most promising. The plant is a strong grower; resembles Senator Dunlop, but is stronger and free from rust, and quite productive. Every berry is as smooth as a ball, is large, crimson with yellow seeds; flesh, reddish pink all through, medium firm and good quality. Well worth trying.

Margaret (Perfect): A kind to grow for fancy market. Will take a lot of petting, and when it gets it, will produce some of the finest berries. The plant is healthy. Makes enough plants for fruiting row.

Marie (Imperfect): A good market berry. A seedling of Crescent. Plant is a good, strong grower, healthy and productive. Berry is large, roundish, somewhat irregular, quite acid but spicy. Medium firm.

New York (Perfect): Resembles Corsican Armstrong very much. See "Armstrong."

No. 99 (Perfect): Sent me by M. Crawford. Did not do very well with me. Will give further trial.

North Shore (Perfect): Has not proved very valuable. I have fruited it two years. Will let it go.

New Home (Perfect): Sent me by introducer, W. F. Allen. Resembles Gandy. No better than Gandy.

Netie (Imperfect): Sent me by the originator, Mr. Black of New Jersey. Plant is strong grower; makes plants freely and quite productive. Berry is very large and irregular. It is one of the latest, if not the very latest. It has done well with me. Not very firm.

Nehrings' Gem (Imperfect): Sent me by M. Crawford of Ohio. The plant is a strong healthy grower, light colored foliage. Medium in productiveness. Berry is good size, good color, promising. Will give further trial.

Nimrod (Perfect): Originated by J. F. Beaver of Ohio, and sent me two years ago. The plant is small and lies close to the ground; healthy and only fairly productive. The berry resembles the old Jersey Queen. Very good quality. Might please the amateur grower.

Oak's Early (Perfect): Sent me by the introducer from Maryland. The plant is a good grower, healthy, small, of dark foliage and very productive. Berry is medium to large, dark red with red seeds; flesh red. Medium firm, good flavor; early to mid-season. Worth a trial. This variety was found by Wm. Tull, by the side of an oak stump, in 1902, hence the name.

Oom Paul (Perfect): Sent me by the introducer and originator, Mr. Kewitt of New Jersey. The plant is large and healthy, making plants freely. Medium in productiveness. Berry is large and somewhat irregular; dark red in color. Not very desirable; only did fairly well.

Olive's Pride (Perfect): Sent to me by originator, J. W. Hall of Maryland. The plant is a good strong grower, healthy and quite productive. The berry resembles the Crescent, from which it is descended. Did well the past year.

Parson's Beauty (Perfect): Originated in Maryland in 1895. Plant is a strong, healthy grower. Of dark green foliage. Makes plants freely. It is quite productive. The berry is like the old Wilson, a dark, rich scarlet. Ripens all over, with yellow seeds. It is firm and good quality; pleasant taste. One of the best for market growers.

PRESIDENT (Imperfect): Sent me by the originator, Mr. Hunt. It is a seeding of a pistillate seeding, fertilized with McOlivier. The plant is large, a good grower, rusts some; fairly productive. The berry is quite large and fine looking, medium in firmness, brings a good price in fancy market. It did well the past year.

PAN-AMERICAN (Perfect): A sport of Bismark. Claimed to be a fall bearer. After three years' trial it has not shown itself of much value. It does sometimes have a few berries in October. I would only grow it as a curiosity. No value for market.

PRESIDENT ROOSEVELT (Imperfect): Too much lost. Not desirable. Will drop it.

PEERLESS (Perfect): Sent me by the originators, H. & H. of Arkansas. Plant is large and strong. A good grower, late bloomer, shy bearer. Not desirable. Will drop it. This has proved a great disappointment here.

PERFECTION (Perfect): The plant is a good strong grower, healthy and productive, berry medium in size, dark scarlet, conical, firm and good quality. Did fairly well.

PROF. FISHER (Perfect): A seedling of Bubach and Sharpless. Sent me by the originator, Mr. Black of New Jersey. The plant is large and healthy, strong grower, and medium in productiveness. Resembles Mrs. Fisher a good deal.

RIDGEWAY (Perfect): Plant does not make many runners, but is healthy. Stools out. Medium productiveness. The berry is large, roundish, of a dark bright red with golden seeds. Firm and of good quality. Medium to late. Worth a trial. A good one.

RYCKMAN (Perfect): The plant is large, good grower and healthy. Only medium in productiveness. The berry is large with a neck roundly conical. Very good quality. Might be grown for a fancy market.

RUBY (Perfect): Plant good grower, making plants freely. Dark foliage and productive. The berry is large, conical like the old Wilson. The quality is good, has done well, is a good one and worth a trial.

SAMPLE (Imperfect): This is one of the best market kinds. I hear good accounts of it from all over. Wherever grown, plant a vigorous, healthy grower and productive, and has always done well with me.

SPLENDID (Perfect): Here is another of the best market varieties. The plant is vigorous, healthy and very productive. The berry is round, bright, scarlet, large and firm. All should grow it.

SUCCESS (Perfect): Plant a good grower, making sufficient plants for a good fruiting row. Productive. The berry is medium to large, roundish, conical, firm. Dark scarlet in color, good flavor. Did well the past season. Early.

SENATOR DUNLOP (Perfect): This is another of the good ones. One of the best market kinds. Plant a good, vigorous grower and quite productive. Berry is conical, dark scarlet, firm, medium early to late. All should grow this variety.

SUTHERLAND (Imperfect): Good grower, healthy, berry softish. Did fairly well.

SUPERIOR (Perfect): Plant good runner. Quite productive.

STEVENS' LATE CHAMPION (Perfect): Plant is a strong, healthy grower, productive. Berry is large, scarlet with yellow seeds, roundish, resembles Glen Mary. Firm, fair quality, late. Worth a trial.

TENNESSEE PROLIFIC (Perfect): One of the old standards. Has always done well with me. Good market berry. Well known.

THREE W'S (Perfect): Sent me by the originator. I have fruited it twice and it has given me a larger crop each time. The plant is a good

grower, strong, healthy and very productive. The berry is large, conical, blunt at end, a bright scarlet color with yellow seeds, good flavor, firm, flesh, pink to white. A good one and worth a trial by all growers. Medium to late season.

TEXAS (Perfect): Plant is large, healthy grower, medium in productiveness. Berry is large for an early berry, firm good quality.

THOMPSON'S No. 3 (Imperfect): Sent me by originator, Mr. Thompson of Virginia. Plant a good healthy grower. Did only fairly well. Will give another trial.

UNCLE JIM (Perfect): Like New York and Armstrong, a good fancy berry.

UNCLE SAM (Imperfect): The plant is a strong healthy grower and productive. The berry is very large, one of the largest, roundish, bright scarlet with red seeds. Fair quality. Medium in firmness. Worth trying. Mid-season to late.

UNCLE JOE (Perfect): Sent me by Vick & Sons of New York. It bore a few large berries. Will give a further trial.

VIRGINIA (Imperfect): Sent me by the introducer, Mr. Allen of Maryland. Originated by Thos. J. Custis of Accomack Co., Virginia. A cross of Hoffman and Sharpless in 1905. A good grower. Makes plants freely. Dark foliage, productive, berry blunt at end, medium to large, dark red with red seeds. Has a cavity. Flesh red, mild, firm. Fair quality. Mid-season.

VAN DEMAN (Perfect): Gave us some of the first ripe berries. Has a long season. Does not do well in some places. Has always done well with me. It is firm, one of the handsomest of berries. It was first sent me by the originator, J. C. Bauer, of Arkansas, twelve years ago.

VICTOR (Perfect): Sent me by M. Crawford. Plant strong. Healthy grower. Productive. Dark green foliage. The berry is large, dark crimson, with yellow seeds, firm and good quality. Did well this season. D. J. Miller of Ohio is the originator of the Victor.

WONDER (Perfect): Known as Sampsell's Wonder. This plant is healthy, a strong grower and productive. Berry is large to very large, dark bright red of good quality, medium of late season. a good one; worth a trial.

WILSON (Perfect): The old Wilson's Albany was a failure this year. I grow it for the purpose of comparison.

WILD WONDER (Perfect): Will drop this variety. After two years' trial it has proved to be of no value to me.

WM. BELT (Perfect): One of the old standards. Did well again this year. It is injured sometimes by the rust. The first berry is irregular generally. The berry is conical, bright, firm and good quality.

WILLIAMS (Perfect): Widely grown for shipping. It can be picked before it is ripe as it colors before it is ripe. Only medium quality. The plant is weakening. Sometimes it rusts badly.

WARFIELD (Imperfect): One of the most productive in a favorable season. Rampant plant maker. Berry dark crimson. Conical, but the plant is very sensitive to any weather. Wants lots of water to do its best.

WOOLVERTON (Perfect): Originated by the late J. Little of Granton and named after L. Woolverton, the Secretary of Experimental Stations. Did well. One of the largest and finest of berries. Plant is strong and healthy grower and a good pollenizer.

YANT (Perfect): Plant strong and healthy, light foliage. Productive. Berry is large, regular, with a neck. Mid-season. Did well the past season.

New Varieties for Trial.

Last spring I received several new varieties from originators and introducers of new varieties. I have them planted in a trial plot for next year's fruiting. Most of them have made a good showing so far. I have not noticed any rust or disease on any of them. They are as follows:—Arizona, Brilliant, Bradley, Blaine, Bower, Crozier, Chipman, Colossus, Diamond, Dixie Belle, Dighton Rock, Evening Star, Golden Gate, Gill, Good Luck, Goldsborough, Great Scott, Goo Rollins, Gen. Joe Wheeler, Howard's No. 1, Irena, King Edward, McNiel, Mill's Seedling, Miss Boston, Oswego, Pride of Michigan, Red Bird, Saratoga, Young's Early Sunrise, World's Wonder, St. Louis.

List for Growers and Season of Fruiting.

Extra Early and Early: Van Deman, Michel, Success, Oak's Early, Heflin's Early, Early Hathaway, Howard's No. 103 and Howard's No. 3, Excelsior, Beder Wood, Texas, Staples.

Early Mid-Season: Splendid, Tennessee, Prolific, Ekey, Warfield Bismark, Senator Dunlop, Parson's Beauty, Reynolds, Homeland, Bubach, Sutherland, Marshall.

Mid-Season: Three W's, Hundred Dollar, Hummer, Glen Mary, Beidler, Jacoma, Mead, Minuteman, Brandywine, Woolverton, President, Kitty Rice, Sample, Uncle Sam, Wonder, Lyon, Marie, Saunders, Williams, Arnout, Virginia, King Edward, Wm. Belt, Greenville.

Late to Extra Late: Aroma, Joe, Gandy, Abingdon, Chesapeake, Steven's Late, Champion, Latest, Howard's 96, Elma, Nettie, Cardinal, Commonwealth.

ESSEX VEGETABLE EXPERIMENT STATION.

By E. E. Adams, Leamington.

Forcing Vegetables.

The conditions for forcing vegetables this year were very unfavorable. No particular success was attained on tomatoes, but cabbage turned out some better, owing to its different nature. Tomatoes require warmth, while cabbage will grow under cool conditions. Tomatoes were planted about May 20th, and were frozen, but the balance of the planting was made, commencing about the 24th and ending about the 28th for early crop. Not much growth was made during June, even with applications of nitrate of soda, but about July 10th they made a good start, and about the last of the month regular shipments began, being about three weeks later than usual. Our cabbage ground was well fitted up for a crop, being fertilized with sheep manure (pulverized) 1,500 pounds, sulphate of potash, 200 pounds, and Peruvian Guano 1,000 pounds per acre, upon soil with a fair crop of rye ploughed in, and 300 pounds of nitrate of soda scattered around the plants and in the rows during growth. This was planted May 1st, and grew very well, with shipments starting June 15th and ending about July 10th. The varieties, Early Jersey Wakefield, Johnson's Early, Glory of Enkhousen, Express, and Maule's First Early, being tested under the same treatment to see if the claims

as made by seedsmen were correct. I find the Wakefield the most profitable, the earliest and most productive, but the Glory of Enkhousen is a good cabbage, having a good hard head of good size and quality; but, for commercial purposes, where earliness and productiveness are large considerations, the Wakefield appears as yet to be the best for this purpose, and the quality is first class, especially where plenty of nitrate of soda is used. The soda appears to give cabbage a character and sweetness that common barnyard manure does not.

Musk melons and cantaloupes were a fair crop, not much later than usual. These generally come into the market about August 12th to 15th, while this year they appeared about the same time from plants started under glass. These plants started under glass, were fertilized with nitrate of soda about half an ounce to the hill; sulphate of potash, one ounce; Peruvian Guano two; all mixed and hoed in, on land where rye had been turned in and planted about June 15th. They started off, and made a very good growth, but not nearly as much as in former years, and set a very good quality of fruit, which made a fast growth in July, and owing to very warm, dry weather in August, ripened up the crop very quickly. There was considerable blight, and while on some varieties it was very bad, others did not show its effect nearly as much.

Spraying was carried on to some extent; the Long Island Beauty and Hackensack did not respond to its use as did the Rocky Ford, Gold Coin, Ideal, Burrell's Gem, Model, Grand Rapids and Unsworth's Perfect. This may show that the Hackensack and Beauty are more tender and that the spraying is not as effective on them. The spray was applied twice only durthe season, once immediately after planting, with Bordeaux and Paris green added to clear them of striped beetle, and again in about four weeks with ammoniacal copper solution, this being used so that the fruit would not be discolored as it would be with Bordeaux applied after fruit has attained considerable size. The seed planted in the field in the usual way gave a very light crop. Owing to the cold weather early in the summer, they were very late in starting, and were small plants when blight struck them, and consequently being tender they melted down as though burnt with fire. This blight appears to be very hard to control, yet some growers think it fairly easy, while in the large melon growing sections of the United States it is considered almost impossible to handle it. This work will have to be handled next season more thoroughly in order to see just what can be done to prevent the destruction of the vines, and bring the crop to maturity with full flavor and quality.

Tomatoes.

The past season has not been a very favorable one for growing some kinds of vegetables. Tomatoes have not had enough warm weather to bring them to their usual perfection. The later varities especially have proven very unprofitable, many growers having lost money on the crop, largely from rot during the month of August. The crop of early varieties was fair only, being considerably later than usual. Usually shipping starts here early in July, but owing to the very cold months of May and June, the plants made very little growth, in fact a large number of plants were killed by frost on May 20th, which caused a diminished crop. The late varieties under test this season were Stone, Plentiful, Magnificent, Beefsteak, and success. I find the stone of the best quality, not only for home use, but it is also considered by canners to be about the best that is grown for their

purpose. The only objection to it on sandy soil is the light crop that it gives. The color is bright red, smooth, solid flesh and large size, and very fine quality. The *Plentiful* has done better with us than some other of the Pink or purple varieties. It is one of the finest tomatoes that I have ever grown. Flesh dark red, solid, smooth, and of good size, two rows filling an 11 quart basket placed on side. This tomato will produce more to the acre than any other that I have grown here. *Magnificent* is a good hard tomato, bright red and smooth, not a good cropper this season, but may prove better next year. Success is a bright red, smooth medium size tomato and not a good cropper here. The *Beefsteak* is also smooth, red, and only a fair cropper. For late crop I would recommend the Plentiful for sandy soil, and the Stone for heavier soil. A large number of early and so-called early varieties were tested this season, the following being the varieties:—Dominion Day, Maule's First of All, Steele's First of All, Rennie's First of All, Imperial Freedom, Swedesboro', Earlibell, Early Jewel, Livingston's Beauty, Magnus, June Pink, Alpha Pink, Early Michigan, Fordhook First, Dwarf Champion, Quarter Century, Globe, Moore's King of the Earlies, Hummer, Atlantic Prize, Earliana, Burpee's Sunnybrook strain of Earliana, Burrell's Earliana, and Johnsons's No. 10 strain Earliana. Among these there are some that cannot be called early, but should be called second early. The Early Jewel, Beauty, Michigan, Hummer, and June Pink being in that class. The Jewel will rot some seasons under certain conditions. This year they rotted badly. The plants were about six inches in length when set out about June 1st, while plants that were in bloom and 12 to 14 inches long heavy and stocky had no rot and were set out about May 24th. Usually any of the above varieties will give a fair to good crop of good fruit. The other Early varieties mentioned are all fairly good on our sandy soil, but the Atlantic Prize on certain soils along Lake Erie appears to be about the best cropper, although taken a mile back from the lake, it is not nearly as good and cannot be as profitable as Earliana. Certain elements in the soil at the Lake appear to be favorable for its development; while the soil along the Talbot Road appears to be better suited to the Earliana. This latter is the best and most profitable one we grow, from the fact that it is early, quite smooth, and ripens well to the stem. It is a very good cropper on soil well prepared with stable manure, well rotted and put on in the previous fall and ploughed under early in spring, and fertilized with potash, phosphoric acid, and nitrate of soda, 200, 40 and 100 pounds respectively. The soda should be applied around the plants a few days after planting, and worked into the soil at once. The Earliana does not do as well as regards ripening when grown on heavier soil, but produces a heavier crop than on sand but later and consequently, from a commercial view, it will not prove valuable. I would recommend the following as the best general list of varieties for sandy soil: Earliana, Atlantic Prize, First of All, Fordhook First, Beauty and Dominion Day; while June Pink, Alpha Pink, Champion, Quarter Century, Magnus, Michigan, and Hummer will prove better for a heavier soil and produce nice, smooth fruit. The Ruby, Swedesboro, Earlibell, King of the Earlies, are all quite rough, and do not prove as valuable for shipping or for home use as most of the others mentioned.

Varieties of Tomatoes.

Earliana: The earliest smooth bright red tomato of good size. Plant is compact in growth, fruit quite uniform in size, flesh quite solid, averaging from 2½ to 4 inches in diameter on sandy soil and much larger on heavy soil.

ATLANTIC PRIZE: As grown on sandy soil at Leamington, it is smooth, firm, a heavy bearer and one of the most profitable to grow for early market. Seed selection has made a wonderful change in this tomato, being now here as smooth as many of the later varieties.

EARLY MICHIGAN: One of the best second early sorts. Size medium to large, smooth, and of a deep, rich red color.

CHALK'S EARLY JEWEL: A good second early; smooth, deep red in color, good size, quality excellent, sometimes is not firm, yet it has been shipped to the Northwest by express, arriving in first class condition. Very prolific.

LIVINGSTON'S BEAUTY: Large, smooth, flesh light pink, vine large and an abundant bearer.

JUNE PINK: An extra early purple fruited tomato, ripens with Earliana or a little later; vine open, a very good bearer.

GLOBE: A new, very large purple fruited variety, of good quality, fruit uneven in size, skin tender and cracks badly in moist weather; cannot be recommended for profit.

DWARF CHAMPION: The plants are close jointed, fruit a glossy purple, very smooth, fine quality. As a cropper it is worthless on sandy soil but on a heavier soil is first class.

QUARTER CENTURY: Similar to Champion, but is bright red. Not profitable.

FORDHOOK FIRST: Not a first-early, but a good second on reasonably good soil. Some seasons it rots badly. Fruit smooth, solid, deep pink in color, fine flavor; vine strong grower, and very desirable on soil not too rich.

MAGNIFICENT: Fruit good size, smooth, perfectly solid, brilliant scarlet; not tested enough to say as yet as to the cropping quality.

ALPHA PINK: A good size pink or purple fruited variety; does not grow smooth enough to be considered as a good market variety.

IMPERIAL: Quite early, of good size, smooth, pink or purple skin, fairly solid, productive.

FIRST OF ALL: Early. Almost as early as Earliana, quite smooth, firm. A good tomato.

SUCCESS: A fine firm fleshed sort, not a good cropper, but first class quality. On heavy soils it bears well, but not on sand.

STONE: A famous main crop; tomatoes of the finest quality, red solid flesh, and on heavy soil a good bearer while on sand is only a fair cropper. Is used by some for hot house forcing.

PLENTIFUL: One of the finest tomatoes grown, fruits of large size, smooth and uniform, heavy bearer, solid flesh pink to purple in color, not extra early, but more for main crop. Very desirable.

BEEFSTEAK: A medium late variety, good bearer, rich red in color, smooth, not sufficiently tested as yet.

EARLIBELL: Not as early as claimed, nor yet as smooth as many others, in fact on rich soil it is very rough, growing too large to be of value as a market variety. Cannot be recommended.

HUMMER: A new tomato, round, large, bright red in color, very firm flesh, fine quality. It is claimed to be early, but has not proven this year, but can be classed as a second early.

MOORE'S KING OF THE EARLIES: Quite early, almost as early as Earliana, but is not as productive, nor as smooth and as firm in flesh, consequently cannot be recommended for commercial purposes.

Musk Melons.

In musk melons this season I have tested Extra Early Hackensack, Long Island Beauty, Unsworth's Perfect, Irondequoit, Ideal, Early Ripe, Gold Coin, Grand, Tip Top, Osage, Model, Grand Rapids, Burpee's Champion Market, Burrell's Gem, Watter's Solid Net Rocky Ford, Burrell's Thoroughbred Rocky Ford, and Pollock's Rust Resister Rocky Ford. The Hackensack, L. I. Beauty, and Unsworth's Perfect are large green fleshed melons of only fair quality, but quite productive, and are perhaps the best selling melons grown to-day for our Ontario markets. Apparently what is wanted is a large melon with some quality, but there is now a growing demand for something of better quality, and the Grand, Osage, Burrell's Gem and the Rocky Ford varieties appear to fill the requirements to perfection. I find however that the Gold Coin and Model and the Ideal are melons of very fine quality, and can recommend them to any one wanting something worth eating. These are all red or salmon colored fleshed, and the Ideal is the largest size of these three, being similar in size to Osage. The Grand is a new melon, red fleshed and of first class quality, ripening up early and of quite even size, making it very desirable.

Ideal: A salmon fleshed variety of fine flavor, of handsome appearance, well netted, good shipper, size similar to Osage and very much the same in appearance, but with more netting on skin. Superior.

Gold Coin: Earlier than Paul Rose, about two or three times as large, of lighter skin, wider ribbed, of deeper flesh and better quality. Fruit round to oblong, very small seed cavity, and one of the finest quality tested this year.

Model: An early melon, larger than Rocky Ford, flesh green, seed cavity small, splendid quality.

The Grand: A new melon, rich salmon flesh, early, ripens up a very even crop quickly, does not crack at blossom end like Osage, and is more desirable than that old and well known variety.

Grand Rapids: A large, oval-shaped, early, low quality melon. Productive, but not desirable in a general sense for market. Salmon fleshed.

Burrell's Gem: A new melon, from Rocky Ford, Colorado, of the finest quality. Shape oblong, flesh rich salmon color; productive. The melon is subject to cracking in wet seasons. Worthy of trial.

Watter's Solid Net Rocky Ford Cantaloupe: The finest type of Rocky Ford that I have grown here. Flesh green, deep, finest quality, seed cavity small, and as the name implies they are almost solidly netted, and not a smooth melon in a crop as far as tested. The best strain of Rocky Ford tested.

Burrell's Thoroughbred Rocky Ford: Color of flesh green, changing to light salomn at the center, seed cavity triangular, the seeds firmly held by three lobes. A good variety, but not equal to Watter's Solid Nett.

Hackensack: Extra early, several days earlier than the old Hackensack, of better quality, green flesh, very early, and a good market sort. Well netted but needs breeding up, as there are a lot of smooth melons in the crop as now grown and they are of no value for market, being flavorless.

Long Island Beauty: Similar to Hackensack in appearance but a little earlier and no better quality, but sell well in markets.

Unsworth's Perfect: A large melon of the Hackensack type, well netted throughout, flesh green, not very deep however, nor of very good quality but one of the largest selling melons on the markets to-day. As tested this year, they do not produce a large crop, but every melon was large and handsome.

Pollock's Rust Resister Rocky Ford: Seed procured from Colorado from the originator, and as tested at the Colorado Experiment Station has proven this year to resist rust or blight better than most varieties tested. The quality of the fruit is not quite equal to Watter's Solid Nett, nor is the bulk of the crop as desirable or as even in shape. Another and better year may show it up differently. It is a heavy cropper.

Early Ripe: Is an early, green fleshed, dark green skinned melon, with nothing to recommend it. The quality is poor, and the shipping qualities are no good.

Champion Market: A green fleshed variety of good quality. Productive, firm and a good shipper for Ontario Markets.

Tip Top: A salmon fleshed variety, quality good, firm flesh, a good shipper, often shipped in car-loads in bulk in Ilinois, skin is slate color, which does not make it a showy melon.

Potatoes.

Sweet potatoes are not largely grown here, but a few are growning them for their own use each year, and usually with good results. The variety that produces the largest crop is the Yellow Nansemond, while for the best quality the Jersey Sweet are much the best, being of good flavor, sweet and dry; while the other variety mentioned is somewhat inclined to have a little peculiar flavor that is not desirable, and is somewhat wet. Virginia Sweets are not much grown since the Jerseys are so much better.

Jersey Sweets: A splendid variety, fine grained flesh, sweet and delicious flavor, rather long and smooth. None better.

Yellow Nansemond: A more productive variety than Jersey Sweets, short, smooth and of chunky growth.

Up-Rivers: A strain of Jersey Sweets, short and of chunky growth, dry and sweet.

Gold Skin: Quality good, sweet, tubers short and of chunky growth.

The past season in this section has been very unfavorable for the growing of Irish potatoes. The spring season was cold, and many were lost after planting; besides some were frozen as late as July 2nd on dark soils. The blight was not serious, being largely prevented by spraying and good cultivation. The crop here is light, and towards spring car-loads will have to be brought in to supply the demand. The varieties largely grown here are, Green Mountain, Sir Walter Raleigh, Early Rose, Beauty of Hebron, Early Harvest, Bovee, Early Ohio, American Wonder, Burpee's Extra Early, Empire State, Carmen No. 1, Seneca Beauty and Banner, while a few others are grown each year for testing purposes. The Early Ohio and Burpee's Extra Early, and some Bovee are generally grown for first early and the others mentioned are grown for later crop, some preferring different varieties for different soils. For sandy soil I recommend Bovee, Burpee, Harvest and Ohio for early market.

Desirable Varieties: Moneymaker, Early Rose, World's Fair, Empire State, Early Ohio, Maule's Thoroughbred, Beauty of Hebron, Rural New Yorker, Burpee's Extra Early, Bovee, Early Harvest, American Wonder, White Elephant.

Map showing relative situations of the Ontario Fruit Experimental Stations.

APPENDIX.

FRUITS RECOMMENDED FOR PLANTING.

Explanatory Remarks.

General Lists: After testing a large number of varieties of fruit at the various fruit stations, the Board of Control has decided upon the following as the most desirable for general planting.

District Lists. The District Lists given by the various experimenters show varieties especially adapted to the sections represented by their stations.

The term "Commercial" is intended to include the varieties most desirable for market purposes, and the term "Domestic" those most desirable for home uses, either cooking or dessert.

These lists are given, as far as possible in the order of ripening.

It is realized that there are many varieties not included in these lists which may do well under special conditions, yet which are generally not considered as desirable as those mentioned.

The Board of Control recognizing the great disadvantage which faces inexperienced persons who desire to engage in fruit growing for profit, because of the very large and confusing list of varieties, has ordered the publication of select lists of tested varieties which shall serve as a guide to intending planters.

GENERAL LISTS

Of the most valuable varieties of fruits recommended to be grown for market in the Province of Ontario, approved by the Board of Control of the Ontario Fruit Stations.

APPLES.

Summer.

Astrachan: Adapted to all sections except in the extreme north.

Duchess: Adapted to all sections.

Fall.

Gravenstein: Adapted to all sections except the St. Lawrence River and other northerly portions of the Province.

Wealthy: Particularly valuable for northern sections.

Alexander: Especially for northern districts.

McIntosh: Adapted especially to the St. Lawrence River district, but can be grown over a much wider area.

Fameuse: Adapted especially to the St. Lawrence River district, but succeeds well over a much wider area.

Blenheim: Adapted to all sections except the St. Lawrence River district and other northerly portions of the Province.

Winter.

KING: Adapted only to the best apple sections, and succeeds best when top grafted on hardy stocks.

HUBBARDSTON: Adapted to the best apple sections.

GREENING: Adapted to the best apple sections.

BALDWIN: Succeeds best on clay land, and is adapted to the best apple districts.

NORTHERN SPY: Adapted to the best apple districts, but can be grown with success farther north by top-grafting on hardy stocks. This is also a good method of bringing it into early bearing.

ONTARIO: An early and abundant bearer, but short lived. Recommended as a filler among long lived trees. Adapted to same districts as Northern Spy, which it somewhat resembles.

STARK: Adapted to best apple districts.

VARIETIES ESPECIALLY ADAPTED TO HOME USE.

Summer.

TRANSPARENT: Adapted to all sections.
PRIMATE: Adapted to best apple sections.
SWEET BOUGH: Adapted to best apple sections.
DUCHESS: Adapted to all sections.

Fall.

CHENANGO: Adapted to best apple sections.
GRAVENSTEIN: Adapted to best apple sections.
WEALTHY: Especially adapted to northern sections.
MCINTOSH: Especially adapted to northern sections.
FAMEUSE: Especially adapted to northern sections.
BLENHEIM: Adapted to best apple sections.

Winter.

KING: Adapted to best apple sections. Should be top grafted.
WAGENER: Adapted to best apple sections.
SWAYZIE: Adapted to all sections except most northerly.
GREENING: Adapted to best apple districts.
TOLMAN: Adapted to best apple districts.
NORTHERN SPY: Adapted to best apple districts, but will succeed farther north if top grafted.

HARDY VARIETIES RECOMMENDED FOR SECTIONS NORTH OF LATITUDE 46 DEGREES.

Summer.

Transparent, Lowland Raspberry, Charlamoff.

Fall and Winter.

Duchess, Wealthy, Hibernal, Longfield, Patten, Whitney, Hyslop.

Crabs Suitable for the Whole of the Province.

Whitney: A large crab of high quality, suitable for planting in the extreme north where other apples will not succeed. May be used for dessert or cooking.
Martha: An early crab of fair quality.
Transcendent: Yellowish crab, season early autumn.
Hyslop: Dark, rich, red crab, of late season, quality only fair.

Blackberries.

Agawam, Snyder, and for southern sections, Kittatinny.

Cherries.

Hardy: Orel, Early Richmond, Montmorency, Russian 207.

Currants.

Black: Black Victoria, Champion, Lee, Naples, Saunders.
Red: Cherry, Fay, Pomona, Red Cross, Victoria, Wilder.
White: White Grape.

Gooseberries.

Pearl, Downing, Red Jacket. Whitesmith is one of the best English varieties, but is almost valueless on some soils and in some localities owing to mildew.

Grapes.

Commercial and Domestic:
Black: Moore, Campbell, Worden, Concord, Wilder.
Red: Delaware, Lindley, Agawam, Vergennes.
White: Niagara, Diamond.
For Northern Sections:
Black: Champion, Moore, Campbell, Worden.
Red: Moyer, Brighton, Delaware, Lindley.
White: Winchell, Diamond.

Peaches.

Commercial:
Sneed: Whitefleshed, clingstone, quality only fair, earliest of all.
Alexander: Whitefleshed, clingstone.
St. John: Yellowfleshed, freestone, quality good.
Mountain Rose: Whitefleshed, freestone, quality very good.
Early Crawford: Yellowfleshed, freestone, quality very good.
Champion: Whitefleshed, freestone, quality very good, for home use, or near markets.
Brigdon: Yellowfleshed, freestone, quality very good.
Fitzgerald: Yellowfleshed, freestone, quality very good.
Reeves: Yellowfleshed, freestone, quality fair, large size.

ELBERTA: Yellowfleshed, freestone, quality fair, good for long distance shipments.

OLDMIXON: Whitefleshed, freestone, quality good.

STEVENS: Whitefleshed, freestone, quality good.

SMOCK: Yellowfleshed, freestone, quality fair, very late, good shipper.

Domestic:

Hynes, St. John, Early Crawford, Oldmixon, Longhurst, Stevens.

PEARS.

Commercial: Giffard, Clapp, Bartlett, Boussock, Flemish (hardy, subject to spot), Howell, Louise, Duchess, Bosc, Clairgeau, Anjou, Kieffer.

Domestic: Summer Doyenne, Giffard, Bartlett, Flemish (for the north), Sheldon, Seckel, Bosc, Anjou, Lawrence, Josephine, Winter Nelis.

PLUMS.

Commercial and Domestic:

AMERICAN: These are extremely hardy and are desirable where the European and Japanese varieties cannot be grown: Aitkin, Cheney, Bixby, Mankato, Wolf, Hawkeye, Stoddard.

EUROPEAN: Bradshaw, Imperial Gage, Gueii, Shipper's Pride, Lombard (liable to over bear, requires thinning), Quackenboss, Yellow Egg, Grand Duke, Golden Drop (Coe), Reine Claude (one of the best for canning).

JAPANESE: These are apparently quite as hardy as the European varieties: Red June, Abundance, Burbank, Chabot, Satsuma (red fleshed, desirable for canning).

QUINCES.

Fuller, Orange (the leading market variety in Ontario), Champion (for Southern Ontario only as it ripens too late for other sections).

RASPBERRIES.

BLACK: Hilborn, Older, Gregg, Smith Giant.

PURPLE: Columbian, Shaffer.

RED: Marlboro, Herbert, Cuthbert.

WHITE: Golden Queen.

STAWBERRIES.

Commercial: Beder Wood (P.), Splendid (P.), Warfield (Imp.), not suited to light sandy soil, Greenville (Imp.), Williams (Imp.), Saunders (P.), Sample (Imp.), Irene (Imp.), Buster (Imp.).

Domestic: Excelsior (P.), Splendid (P.), Senator Dunlop (P.), Ruby (P.), Bubach (Imp.), Lovett (P.), Irene (Imp.), Belt (P.).

NOTE.—These varieties somewhat in order of their ripening season.

In selecting varieties for planting, perfect-flowered varieties should be included to fertilize those having imperfect flowers.

DISTRICT LISTS OF FRUITS.

Recommended by the experimenters for planting in the districts represented by their respective stations.

NIAGARA DISTRICT.

(Including Niagara peninsula from Niagara river to Hamilton).

By Linus Woolverton, Grimsby, Ont.

Apples.

Commercial: Astrachan, Duchess, Gravenstein, Alexander, Blenheim, King, Greening, Baldwin, Spy.

Domestic: Early Harvest, Sweet Bough, Duchess, Chenango, Gravenstein, Shiawassee, Fall Pippin, Fameuse, Swayzie, Wagener, Esopus (Spitzenburg), Tolman.

Blackberries.

Commercial and Domestic: Kittatinny (largest berry, but bush subject to orange rust); Agawam.

Cherries.

Commercial: Wood, Knight, Napoleon, Tartarian, Dyehouse, Montmorency, Elkhorn, Windsor, English Morello, Bessarabian.

Domestic: May Duke, Cleveland, Knight, Elton, Tartarian, Hortense, Choisy, Black Eagle, Mezel, Royal Duke.

Currants.

Red: Cherry, Fay, Victoria, Wilder.

White: White Grape.

Black: Saunders, Lee's Prolific.

Peaches.

Commercial: Sneed, Alexander, Greensboro, Triumph, St. John, Early Crawford, New Prolific, Champion, Elberta, Willet, Smock.

Domestic: Rivers, Hynes, St. John, Early Michigan, Lewis, Crosby, Champion, Reeves, Wonderful, Jacques Rareripe, Wheatland, Longhurst.

Plums.

Commercial: Red June, Burbank, Bradshaw, Chabot, Gueii, Golden Drop (Coe), Quackenboss, Satsuma, Reine Claude.

Domestic: Abundance, Washington, Yellow Egg, Shropshire, Quackenboss, Satsuma, Reine Claude.

Quinces.

Orange.

By Murray Pettit, Winona, Ont.

Peaches.

Commercial: Alexander, Yellow St. John, Early Crawford, New Prolific, Elberta, Smithson, Yellow Rareripe, Lemon Free, Smock.

PLUMS.

Commercial: Burbank, Bradshaw, Lombard, Grand Duke, Reine Clude, Monarch.

GRAPES.

Commercial:
Black: Champion, Campbells, Worden, Wilder, Concord.
Red: Delaware, Lindley, Agawam, Vergennes, Catawba.
White: Niagara, Diamond.
Domestic:
Black: Black Delaware, Early Dawn, Mills.
Red: Delaware, Jefferson, Moyer.
White: Lady, Winchell.

PEARS.

Commercial: Giffard, Bartlett, Louise, Howell, Anjou, Duchess (Dwarf), Kieffer.

LAKE ERIE DISTRICT.

(Including approximately the northern shore of Lake Erie from the eastern boundary of Elgin County to the Detroit River and the eastern shore of the River St. Clair and Lake Huron to the northern boundary of Lambton County.

By J. L. Hilborn, Leamington, Ont.

APPLES.

Commercial: Duchess, Blenheim, Baldwin, Stark, Hubbardston, Spy.
Domestic: Transparent, Golden Sweet, Duchess, King, Tolman, Spy.

BLACKBERRIES.

Snyder, Eldorado.

CHERRIES.

Early Richmond, Montmorency.

CURRANTS.

Commercial:
Red: Wilder, Raby Castle.
Black: Lee, Black Victoria.
White: White Grape.

GOOSEBERRIES.

Pearl, Downing, Whitesmith.

GRAPES.

Commercial:
Black: Champion, Wilder, Concord.
Red: Lindley, Brighton, Catawba.
White: Niagara.

Domestic:
Black: Moore's Worden.
White: Diamond.
Red: Delaware, Brighton, Jefferson.

PEACHES.

Commercial: Dewey, St. John, Brigden, New Prolific, Engol, Kalamazoo, Elberta, Banner and Gold Drop.
Domestic: Dewey, Mountain Rose, Engol, Old Mixon, Crosby, Gold Drop.

PEARS.

Bartlett, Duchess, Anjou.

PLUMS.

Burbank, Bradshaw, Lombard, Imperial Gage, Reine Claude.

RASPBERRIES.

Commercial:
Black: Hilborn, Palmer.
Red: Marlboro, Cuthbert.

Domestic:
Black: Hilborn, Palmer.
Red: Turner.
Yellow: Golden Queen.

BURLINGTON DISTRICT.

(The western shore of Lake Ontario, between Hamilton and Toronto).

By A. W. Peart, Burlington, Ont.

APPLES.

Commercial: Astrachan, Duchess, Wealthy, Ribston, Blenheim, King, Greening, Baldwin, Spy.
Domestic: Astrachan, Sweet Bough, Gravenstein, Wagener, Seek, Golden Russet.

BLACKBERRIES.

Commercial and Domestic: Snyder, Ancient Briton, Western Triumph, Agawam.

CHERRIES.

May Duke, Windsor, Early Richmond, Montmorency, English Morello.

CURRANTS.

Commercial:
Black: Lee, Naples, Saunders, Collin's Prolific.
Red: Cherry, Fay, North Star, Prince Albert, Victoria, Wilder.
White: White Grape, Imperial.

GRAPES.

Black: Moore's Early, Worden, Concord.
Red: Delaware, Lindley, Massassoit.
White: Niagara, Diamond.

PEACHES.

Sneed, Alexander, St. John, Early Crawford, Champion, Elberta, Smock.

PEARS.

Commercial: Wilder, Clapp, Bartlett, Boussock, Louise, Duchess (dwarf), Anjou, Kieffer, Winter Nelis, Easter Beurre.
Domestic: Wilder, Bartlett, Louise, Anjou, Winter Nelis.

PLUMS.

Commercial:
European: Bradshaw, Niagara, Imperial Gage, Lombard, Yellow Egg, Glass, Reine Claude, Staunton.
Japan: Red June, Abundance, Burbank, Chabot, Satsuma.
Domestic: Saunders, Bradshaw, Imperial Gage, Smith Orleans, Lombard, Yellow Egg, Satsuma, Reine Claude.

RASPBERRIES.

Marlboro, Cuthbert, Herbert.

GOOSEBERRIES.

Pearl, Downing, Red Jacket.

STRAWBERRIES.

Beder Wood, Senator Dunlop, Williams, Gibson, Glen Mary, Leader.
NOTE.—There are doubtless other varieties of fruits, which will succeed as well, or perhaps better, in different localities of this district, while, on the other hand, some of the above varieties may not be profitable in certain sections.
The adaptability of some fruits is very local indeed.

LAKE HURON DISTRICT.

(Including the east shore of Lake Huron from the northern boundary of Lambton County to Owen Sound).

By A. E. Sherrington, Walkerton, Ont.

APPLES.

Commercial: Duchess, McIntosh, Fameuse, Blenheim, King, Greening, Baldwin, Tolman, Northern Spy, Golden Russet, Ben Davis, Stark.
Domestic: Astrachan, Duchess, McIntosh, Fameuse, Blenheim, King, Greening, Tolman, Northern Spy.

BLACKBERRIES.

Agawam, Eldorado.

CHERRIES.

English Morello, Montmorency.

CURRANTS.

Red: Wilder, Red Cross, Fay, Prince Albert.
Black: Champion, Naples, Saunders, Victoria.
White: Grape, Imperial.

GOOSEBERRIES.

Downing, Pearl.

GRAPES.

Champion, Concord, Moore, Worden, Niagara.

PEARS.

Clapp, Bartlett, Louise, Clairgeau, Anjou, Lawrence.

PLUMS.

Burbank, Field, Gueii, Bradshaw, Imperial Gage, Quackenboss, Shipper's Pride, Purple Egg, Lombard, Monarch, Yellow Egg, Grand Duke.

RASPBERRIES.

Black: Hilborn, Conrath.
Red: Marlboro, Herbert, Cuthbert.

GEORGIAN BAY DISTRICT.

(Southern Shore of the Georgian Bay from Owen Sound to Midland).

J. G. MITCHELL, CLARKSBURG, ONT.

For Commercial and Domestic purposes.

APPLES.

Summer: Red Astrachan, Duchess.
Fall: Gravenstein, St. Lawrence, Wealthy, Alexander, McIntosh, Twenty-ounce.
Winter: Baldwin, Spy, King, R. I. Greening.

CHERRIES.

Early Richmond, May Duke, Montmorency, Olivet.

CURRANTS.

Cherry, Black Champion, Fay's Prolific, Lee's Prolific.

GOOSEBERRIES.

Red Jacket, Downing, Houghton, Pearl, Industry.

Grapes.

Champion, Diamond, Green Mountain, Niagara, Salem.

Peaches.

Fitzgerald, Crawford's Early, Crawford's Late, Champion, Crosby, Triumph. Tyhurst.

Pears.

Bartlett, Clapp's Favorite, Flemish Beauty, Anjou, Duchess, Howell, Bartlett-Seckel, Beurre Clairgeau, Louise Bonne de Jersey, Kieffer.

Plums.

Red June, Washington, Bradshaw, Imperial Gage, Quackenboss, Arch Duke, Monarch, Yellow Egg, Coe's Golden Drop, Lombard, Reine Claude, Prune d'Agen.

Raspberries.

Red: Marlboro, Cuthbert, Loudon.
Black: Older, Hilborn, Gregg.

LAKE SIMCOE DISTRICT.

(Including the country bordering on Lake Simcoe.)

By G. C. Caston, Craighurst, Ont.

Apples.

Commercial: Duchess, Peerless, Alexander, Wolf, Blenheim, Pewaukee, Stark, Baxter, Seek, and the following if top-worked on hardy stocks: Greening, King, Ontario, Baldwin, Spy.

Domestic: Astrachan, Louise, St. Lawrence, Fameuse, McIntosh, King, Spy.

Blackberries.

Commercial and Domestic: Agawam, Eldorado.

Cherries.

Commercial and Domestic: Orel 24, Ostheim, Lithaur, Russian 207, Montmorency, Bessarabian, Dyehouse, English Morello.

Currants.

Fay, Versaillaise, Cherry, White Grape, Black Naples, Victoria.

GOOSEBERRIES.

Pearl, Downing.

GRAPES.

Moyer, Moore's Early, Diamond, Green Mountain, Campbell's Early.

PEARS.

Bartlett, Clapp.

PLUMS.

Staunton, Burbank.

RASPBERRIES.

Herbert (Early), Marlboro, Cuthbert.

GUELPH DISTRICT.

(Including the high inland Counties of southwestern Ontario, i.e., Wellington, north Waterloo, northeasterly Perth, southerly part of Grey, southwesterly part of Dufferin, and northwesterly section of Peel and Halton.)

List recommended by Prof. H. L. Hutt, O.A.C., Guelph, Ont.

APPLES.

Commercial: Duchess, Alexander, Trenton, Wealthy, Fameuse, McIntosh, Salome, Spy.
Domestic: Astrachan, Duchess, Wolf River, Wealthy, Fameuse, McIntosh, Bellflower, Tolman.
Crab Apples: Whitney, Martha.

BLACKBERRIES.

None.

CHERRIES.

Early Richmond, Montmorency

CURRANTS.

Red: Red Cross, Victoria, Fay.
White: White Grape.
Black: Black Victoria, Champion, Saunders.

GOOSEBERRIES.

Pearl, Red Jacket, Whitesmith.

GRAPES.

Black: Moore's Early.
Red: Moyer.
White: Winchell.

PEACHES.

None.

PLUMS.

Bradshaw, Imperial Gage, Shipper's Pride, Lombard, Reine Claude, Glass.

PEARS.

Clapp's Favorite, Bartlett, Flemish Beauty, Seckel, Sheldon, Anjou.

RASPBERRIES.

Red: Marlboro, Herbert, Cuthbert.
Purple: Columbian.
White: Golden Queen.
Black: Older, Smith's Giant.

STRAWBERRIES.

Splendid, Warfield, Fountain, Ruby, Parsons, Williams, Senator Dunlop.

BAY OF QUINTE DISTRICT.

(Including the northern shore of Lake Ontario, from Toronto to Kingston.)

BY W. H. DEMPSEY, TRENTON, ONT.

APPLES.

Commercial: Duchess, Gravenstein, Trenton, Alexander, Wealthy, Fameuse, McIntosh, King, Greening, Baldwin, Ontario, Seek, Spy, Tolman, Ben Davis, Stark.
Domestic: Benoni, Primate, Gravenstein, Fameuse, McIntosh, Grimes, Greening (R.I), Ontario, Spy, Tolman, Swayzie.

PEARS.

Commercial and Domestic: Giffard, Tyson, Clapp, Boussock, Hardy, White Doyenne, Dempsey, Bosc, Clairgeau, Goodale, Lawrence, Josephine.

CHERRIES.

Commercial and Domestic: Early Richmond, Montmorency.

ST. LAWRENCE DISTRICT.

Including the Valley of the St. Lawrence River from Kingston to Cornwall.

BY HAROLD JONES, MAITLAND, ONT.

APPLES.

Commercial: Duchess, Alexander, Wolf, Scarlet Pippin, Fameuse, McIntosh, Baxter, Milwaukee, Golden Russet.
Domestic: Transparent, Brockville Beauty, Scarlet Pippin, Fameuse, McIntosh, Blue Pearmain, Golden Russet, Yellow Bellflower.

Cherries.

Commercial and Domestic: Early Richmond, Montmorency, Orel, English Morello.

Pears.

Domestic: Clapp, Flemish, Ritson.

Plums.

Domestic:
European: Gueii, Lombard, Shipper's Pride, Glass.
Japan: Red June, Burbank.
American: Milton, Whitaker, Hammer.

OTTAWA DISTRICT.

Including Ottawa Valley, south of latitude 46 degrees.

By W. T. Macoun, Horticulturist, Experimental Farm, Ottawa.

Apples.

Commercial and Domestic:
Summer: Transparent, Lowland Raspberry, Duchess.
Autumn: St. Lawrence, Wealthy, Alexander.
Early Winter: McIntosh, Fameuse, Wolf River.
Winter: Milwaukee, Baxter, Scott, Winter.
Additional varieties suggested for domestic use.
Summer: Langford Beauty.
Autumn: Peach of Montreal, McMahon.
Winter: Swayzie, Pewaukee, Golden Russet, Rufus.

Crab Apples.

Domestic only: Whitney, Martha, Hyslop.

Blackberries.

Domestic only: Agawam, Snyder.

Cherries.

Domestic only: Orel, Vladimir, Minnesota Ostheim, Cerise d'Ostheim.

Currants.

Commercial and Domestic:
Black: Saunders, Collins Prolific, Black Victoria.
Red: Pomona, Victoria, Red Dutch, and Wilder in most favored parts.
White: White Grape.

Gooseberries.

Commercial and Domestic: Pearl, Downing, Red Jacket.

Grapes.

Black: Early Daisy, Manito, Moore's, Worden, Wilder.
Red: Moyer, Brighton, Delaware, Lindley.
White: Golden Drop, Winchell, Diamond.

Pears.

Commercial and Domestic: Flemish in most favored parts.

Plums.

Commercial and Domestic:
Americana and Nigra: Aitkin, Bixby, Mankato, Cheney, Wolf, Admiral Schley, Brackett, Hawkeye, Stoddard.
European-Domestic: Early Red (Russian) Mount Royal, Raynes, Glass, Montmorency, Perdrigon.

Raspberries.

Commercial and Domestic:
Black: Hilborn, Older.
Red: Marlboro, Herbert.
Yellow: Golden Queen.

Strawberries.

Commercial: Splendid (P.), Beder Wood (P.), Warfield (Imp.), not suited to light soil, Greenville (Imp.), Pocomoke (P.), Sample (Imp.), Buster (Imp.).
Domestic: Excelsior (P.), Splendid (P.), Senator Dunlop (P.), Lovett (P.), Bubach (Imp.), Belt (P.).

ALGOMA DISTRICT.

The islands Manitoulin and St. Joseph, and a limited portion of the northern and eastern shore of the Georgian Bay.

By Chas. Young, Richards Landing, Ont.

Apples.

Commercial and Domestic:
Summer: Yellow Transparent, Charlamoff, Astrachan.
Fall: Duchess, Peach, St. Lawrence, Gideon, Colvert, Basil the Great.
Early Winter: Longfield, Wealthy, Alexander, Wolf River, Walbridge.

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THIRTY-EIGHTH ANNUAL REPORT

OF THE

ENTOMOLOGICAL SOCIETY OF ONTARIO

1907

PUBLISHED BY THE ONTARIO DEPARTMENT OF AGRICULTURE, TORONTO.

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1908

WARWICK BRO'S & RUTTER, Limited, Printers,
TORONTO.

To the Honourable SIR WILLIAM MORTIMER CLARK, K.C.,

Lieutenant-Governor of the Province of Ontario.

MAY IT PLEASE YOUR HONOUR:

I have the pleasure to present herewith for the consideration of your Honour the Report of the Entomological Society for 1907.

Respectfully submitted,

NELSON MONTEITH,
Minister of Agriculture.

Toronto, 1908.

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THIRTY-EIGHTH ANNUAL REPORT

OF THE

Entomological Society of Ontario,

1907.

To the Honourable Nelson Monteith, Minister of Agriculture:

SIR,—I have the honour to present herewith the Thirty-eighth Annual Report of the Entomological Society of Ontario, which contains the proceedings of the Forty-fourth Annual Meeting of the Society. A full account is given of the discussions upon fruit-tree insects that took place, the papers that were read and the reports of the various Officers, and Branches of the Society. Since the removal of its headquarters to Guelph and its more intimate connection with the Ontario Agricultural College, its activities have been increased and its work carried on with much enthusiasm and success.

The Canadian Entomologist, the monthly magazine of the Society, has been regularly issued during the year and has now completed its thirty-ninth annual volume. Its high scientific character has been steadily maintained.

I have the honour to be, Sir,

Your obedient servant,

CHARLES J. S. BETHUNE,
Editor.

Ontario Agricultural College,
Guelph.

Entomological Society of Ontario.

OFFICERS FOR 1907-1908.

President—James Fletcher, LL.D., F. R. S. C., F. L. S., Entomologist and Botanist of the Experimental Farms, Ottawa.

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Editor of the "Canadian Entomologist"—Rev. Prof. Bethune, Guelph.

Editing Committee—Dr. Fletcher, Ottawa; H. H. Lyman, Montreal; J. D. Evans, Trenton; Prof. Lochhead, Macdonald College, P. Q.; G. E. Fisher, Burlington, J. B. Williams, and C. W. Nash, Toronto.

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Begin, Rev. Abbe, P. A. ..... Sherbrooke.
Bickell, Miss ..... Quebec.
Boulton, A. R. M. ..... "
Boulton, Mrs. ..... "
Bowen, Miss ..... "
Brainerd, Dwight ..... Montreal.
Brainerd, H. ..... "
Burgess, Dr. T. J. W. ..... Verdun.
Chagnon, Gustave ..... Montreal.
Clark, Rev. Wylie, C. ..... Quebec.
Davis, M. W. ..... Montreal.
Denny, E. ..... "
Dunlop, G. C. ..... "
Elliott, W. R. ..... Sherbrooke.
Faulconer, Mrs. ..... Levis.
Faulconer, Miss Clare ..... "
Fosberry, C. S. ..... Montreal.
Freeman, Miss I. H. ..... Quebec.
Fyles, H. ..... Levis.
Fyles, Miss W. ..... "
Fyles, Mrs. ..... "
Fyles, Rev. Dr. T. W. ..... "
Geggie, James ..... Beauport.
Geggie, Miss Lois ..... "
Gibb Lachlan ..... Montreal.
Griffin, A. ..... "
Hamel, Miss Julia ..... Levis.
Hedge, Miss Louisa ..... "
Huard, Rev. Victor ..... Quebec.
Johnston, Miss M. G. ..... Levis.
Kollmar, E. J. ..... Montreal.
Lindsay, Col. Crawford ..... Quebec
Lochhead, Prof. ..... Ste. Anne de Bellevue.
Lyman, H. H. ..... Montreal.
MacLeod, Miss E. ..... Quebec.
Moore, G. A. ..... Montreal.
Newman, C. P. ..... Lachine Locks.
Norris, A. E. ..... Montreal.
Poston, Mrs. T. A. ..... Levis.
Reford, L. ..... Montreal.
Robertson, Miss ..... Quebec.
Seton, Mrs. W. W. ..... Levis.
Simmons, J. H. ..... "
Simmons, Mrs. J. H. ..... "
Southee, G. R. ..... Outremont.
Swaine, J. M. ..... Ste. Anne de Bellevue.

Tourchot, A. L.....St. Hyacinthe
Turnbull, Lt.-Col. F.....Quebec.
Turner, Hon. Richard..... "
Turner, Mrs. R..... "
Wade, Miss.....New Liverpool.
Weir, Douglas.....Montreal.
Winfield, Mrs.....Quebec.
Winn, A. F.....Montreal.
Wood, Rev. Edmund..... "

ALBERTA.

Baird, Thos.....High River.
Dod, F. H. Wolley.....Millarville.

BRITISH COLUMBIA.

Abercrombie, Miss Ivy.....Vancouver.
Anderson, E. M.....Victoria.
Anderson, J. R.....Victoria.
Armstrong, E. W.....Salmon Arm.
Bryant, T.....Vancouver.
Bush, A. H..... "
Cockle, J. W.....Kalso.
Danby, W. H.....Rossland.
Dashwood-Jones, W. A.....New Westminster.
Day, G. O.....Duncan's Stn.
Draper, R.....Vancouver.
English T. M.....Cowichan Stn.
Findlay, Rev. G. H.....Fort Steele.
Foster, F.....Vancouver.
Grassham, R. T.....Keithly Cr'k
Hanham, A. W.....Duncan's Stn.
Harvey, R. V.....Vancouver.
Keen, Rev. J. H.....Metlakatla.
Livingston, C.....Duncan's Stn.
Luscombe, P.....Cowichan Bay.
Marmont, L. E.....Vancouver.
Marrion, H.....Vancouver.
Reed, E. Baynes.....Victoria.
Sherman, R. S.....Vancouver.
Skinner, E. M.....Duncan's Stn.
Taylor, Rev. G. W.....Wellington.
Towler, J.....Vancouver.
Van Steenweyk, Miss..... "
Venables, E. P.....Vernon.
Wilmot, E. S..... "
Wilson, T.....Vancouver.

MANITOBA.

Criddell, Norman.....Aweme.
Dennis, A. J.....Miniota.
Heath, E. F.....Cartwright.
Wallis, J. B.....Winnipeg.

NOVA SCOTIA.

Hervey, C. L. G.....Round Hill.
Mackay, Dr. A. H.....Halifax.
Russell, John.....Digby.

SASKATCHEWAN.

Croker, A. J.....Redvers.
Willing, T. N.....Regina.

HONORARY MEMBERS.

Ashmead, Dr. W. H.....Washington, D.C.
Cockerell, Prof. T. D. A.....Boulder, Col.
Cresson, Ezra T.....Philadelphia Pa.
Edwards, William H.....Coalburgh, W. Va.
Howard, Dr. L. O.....Washington, D. C.
Scudder, Dr. S. H.....Cambridge, Mass.
Smith, Prof. J. B.....New Brunswick, N. J.
Uhler, P. R.....Baltimore, Md.
Webster, F. M.....Washington, D.C.
Wickham, Prof. H. F.....Iowa City, Iowa.

LIFE MEMBER.

Saunders, Dr. William.....Ottawa.
Director of the Experimental Farms of the Dominion.

ENTOMOLOGICAL SOCIETY OF ONTARIO.

ANNUAL MEETING.

The forty-fourth annual meeting of the Society was held in the Biological Building of the Ontario Agricultural College, Guelph, on Thursday, October 31st, and Friday November 1st. The chair was taken by the President, Dr. James Fletcher, Entomologist and Botanist of the Dominion Experimental Farms. Among those present were Rev. Dr. Fyles, Levis, P.Q.; Mr. Henry H. Lyman, Montreal; Mr. Arthur Gibson, Central Experimental Farm, and Mr. C. H. Young, Ottawa; Dr. Brodie, Dr. E. M. Walker, Mr. J. B. Williams and Mr. C. W. Nash, Toronto; Mr. J. F. Calvert, Orangeville; Professors Hutt, McCready and Bethune, Messrs. Jarvis, Eastham, Howitt, Zavitz, Crow, Klinck, and a number of students of the Ontario Agricultural College; Mr. Howes, Principal of the Consolidated School, Mr. Graesser and others, Guelph.

Letters expressing regret at their inability to be present were received from Mr. C. C. James, Deputy Minister of Agriculture for Ontario; Mr. W. H. Harrington, Ottawa; Mr. G. E. Fisher, Burlington; Prof. Dearness and Messrs. W. E. Saunders and J. A. Balkwill, London; Mr. J. Fred. Smith, San Jose Scale Inspector for Ontario; Mr. Walter James Brown, Editor of the *Weekly Globe and Canada Farmer*, Toronto; Mr. A. McNeill, Chief of the Fruit Division, Department of Agriculture, Ottawa; Mr. P. W. Hodgetts, Secretary of the Fruit Growers' Association, and others.

THE ENTOMOLOGICAL OUTLOOK.

[*The Annual Address of the President.*]

By Dr. James Fletcher, Dominion Entomologist, Ottawa.

Ladies and Gentlemen: It is with feelings of pleasure and pride that I welcome you and invite all present to take part in the Forty-fourth Annual Meeting of the Entomological Society of Ontario. During its long and useful life, this organization through its efficient officers, has made a constant and consistent endeavour to render its efforts not only useful to the Province in which it has held an official position as an intregal part of the Department of Agriculture, but also effective in advancing the scientific development of the science of entomology. Under the patronage and with the expressed sympathy and encouragement of the Minister of Agriculture and our highly esteemed Deputy Minister of Agriculture, our society has from the beginning until the present time continued to grow in usefulness and public appreciation among those for whom our efforts have been made. It is not now necessary to draw attention individually to the many stalwart men who have served on the councils, everyone of whom has been of great value to the society in adding to its stability, dignity, and usefulness; in building up its reference collections and magnificent library; in solving the various

problems which have arisen with the sudden appearance in destructive numbers of many injurious insect pests; and also in presenting to the public in its publications, the *Canadian Entomologist* and the Annual Reports, a vast amount of valuable knowledge, by which science has been enriched and enormous sums of money have been saved to Canada at a disaproportionately small expenditure. All of this has been done at the cost of much self sacrifice, but quietly and without ostentation. In this good work, this great work, there are, however, two names which I cannot refrain from mentioning, William Saunders and Charles J. S. Bethune. These two men to whom we owe so much, were associated together in founding the society, and from that time to the present day have been, with their energy, patience, discretion and unfailing courtesy, main stays of its progress and healthy growth. Without undue glorification, it is well that our members should recollect the long period over which this work of unbroken activity has extended; and it behoves us to see well to it that, as members of such a worthy society, our very best efforts are put forth in all the work we do, to take the fullest advantage of the greater facilities we enjoy to-day over those who have preceded us in our chosen field. Let us never forget the debt we owe to the pioneers of science. The results of the dearly bought experience of the past form a solid foundation of fact upon which we now stand firmly and confidently, to enter upon new fields of investigation. The status of entomological research to-day is far different from what it was even ten years ago. The number of devotees to these attractive studies is easily a hundredfold greater than then. The same may be said of almost every aspect of the case:—the available works of reference, the greater facilities and decreased cost of communicating with others, of local or distant travel, and, above all, the spirit of helpfulness to others less informed than themselves, so conspicuously exhibited by specialists in every branch of scientific study.

We in Canada can never over-estimate what we owe to the generosity and ever-ready assistance of the eminent fellow-workers in the great republic to the south of our borders, who have made America the chief fountain head and acknowledged centre of applied entomolgy. The names of such men as Riley, Walsh, Lintner, Howard, Comstock, Forbes, Webster, Smith, Marlatt, Felt and a host of others too numerous to mention, are known and honoured the whole world over, but nowhere more sincerely than in Canada, where we owe so much to them. As we all know, it is very seldom that an outbreak of any serious pest occurs in any part of the Dominion, but we can at once by consulting the writings of these men, learn all that is known of the habits of the insect and what the experience of many students has shown to be the best means of dealing with it. In entomolgy, at any rate, whether purely scientific or applied to the industries of the nation, there is no recognition of international boundary lines, unless perhaps it may be as an excuse for extending exceptional courtesies. Canadians are welcomed as freely at all the great conferences in the United States and have as full privileges of membership open to them as though they were freeborn citizens of the Union. At the recent organization of the Entomological Society of America, the most important entomological society in the world, two of the officers of this society were elected as original fellows and placed on the council, one of them being made a Vice-President. Since then two more members of our Council have been elected to fellowships, a highly coveted honour.

On the other hand, I need not remind you of the inspiring visits and addresses we have been favoured with at our recent annual meetings by Dr. Howard, Prof. Webster, Dr. Smith, Prof. Wickham, Dr. Skinner and our

honoured guest of the present meeting, Mr. A. H. Kirkland, who will explain to us the remarkable work which is being carried on under his superintendence against the Gypsy and Browntail moths in the State of Massachusetts.

It has long been a matter of surprise, even more than that, of amazement, to those who understand the enormous losses caused by insects to every class of vegetable products, that the study which deals with these powerful enemies and from which all remedies must emanate, should be so lightly esteemed by the general public. That this—may we call it, age of darkness and ignorance?—is now passing away, is evidenced by the important international investigations which are being carried on by Governments in all parts of the world at apparently enormous expenditure. I say "apparently," because the good results obtained so far outweigh in magnitude all the cost of securing them, that this latter must be considered trifling by comparison. One needs but to think of the immense saving which has been effected in checking or controlling some of the better known extensive invasions of insects. The prompt application of practical remedies could only be made where scientific investigations both of the life-histories and of the most appropriate remedies had already cleared the way and had pointed out what must be the road to success.

The large expenditures authorized by Governments from time to time for the purpose of investigating the habits of, and fighting against, injurious insects, have to some measure opened the eyes of the world to the important role played by insects as affecting the general welfare, and the necessity of dealing with them promptly and vigorously. Grasshopper invasions have in the past caused widespread devastation of fertile lands; but, with a knowledge of the egg-laying habits and with modified agricultural treatment of the land based on this knowledge, such losses can be to a large measure controlled. The San José Scale, although confined to only one comparatively small area in Ontario, and to two isolated points in British Columbia, has been the cause of considerable loss in the orchards of the Niagara Peninsula and also of much anxiety to Governments and fruit growers of the whole Dominion. From the vast amount of experimental work of many students here and in the United States, a practical remedy has been discovered in the lime-sulphur wash. The San José Scale has called for the voting of large sums of money in Canada and in almost every State of the Union; and, although, as stated, a practical remedy has now been found, it is probable that for all time fruit growers, in those districts where that insect thrives, will every year have to take steps to control it. This, however, it must be remembered, is not because the remedy is not all-sufficient, but, because, even against this well understood and justly dreaded enemy, so many fruit growers do not take the necessary steps or even ordinary precautions to control it. Perhaps the best known and most convincing instance of a large expenditure of this nature, is that for the campaign which has been waged against the Gypsy and Browntail moths in the State of Massachusetts. Up to the year 1900 a great deal of money had been spent against the former of these, and it had been almost vanquished, when, for political reasons, the appropriations were most unfortunately stopped. This was, it can now be seen, a most deplorable mistake; for during the following five years nothing was done, and the whole of the area previously infested was again overrun and fresh territory was invaded. The necessary appropriations up to the present time have now reached the sum of about two million dollars, and the Federal Government has had to step in and help. Although wonders have been achieved by Mr. Kirkland and his associates,

the end is by no means in sight. The thorough work done by Mr. Kirkland and Dr. Howard in connection with the introduction of parasites from Europe are an object lesson to the whole scientific world.

Dr. Howard, when speaking as president of the section of Economic Zoology, at the great international Congress of Zoologists held at Boston in August last, referred to this work in the New England States as being the most extensive campaign in economic entomology that the world has ever seen. He commended most highly the practical and efficient way in which it had been conducted, justly giving credit to Mr. Kirkland for his great executive ability and discretion in dealing successfully with a most difficult problem.

Another campaign calling for enormous sums of money and the greatest scientific skill, on the part of those engaged in the warfare, was made necessary by the spread of the Cotton Boll Weevil from Mexico into the United States. The extent of the damage done by this insect can hardly be believed by those who have not studied the matter; but in some seasons of great abundance the loss in a single year has been estimated at twenty-five millions of dollars, and it is said that the weevil is gradually spreading farther through the Southern States every year.

The Hessian Fly, the Wheat Midge, the Chinch Bug, and recently the Grain Aphis have all been the cause of great losses to the countries where they have occurred; but it is now generally recognized that, with these insects, as with nearly all others, farmers, fruit growers and gardeners can get from expert students of insect life useful information as to improved agricultural methods and as to tested remedies, by which much of the loss may be prevented. The publication of popular reports by provincial, state and federal governments has familiarized many with the appearance of their worst insect enemies; and the introduction of the so-called Nature Study into schools has taught a large number of the fathers and mothers of school boys and girls throughout the country, as well as the scholars themselves, that it is worth the while of every one to know something about the comm n insects which they see about them every day.

Characters which among others render insects particularly useful in Nature Study and in the higher exercises of animal biology, are, the large numbers of common species which are always accessible; their convenient size; the ease with which many kinds can be kept alive and reared in confinement to almost any required number, so that their habits can be studied under varying conditions; and the general similarity of a large number of specimens of a given species, and yet, at the same time, the wide range of certain features of variation within the limits of a single species. One of the greatest drawbacks to the use of insects, particularly in a school where there is no regular museum, is the perishable nature of specimens, if it should be desirable to preserve them. This, however, takes them out of the proper field of Nature Study, into natural history pure and simple, where provision must be made for the preservation of specimens so that they may be available whenever required for study and comparison.

The remarkable discoveries which signalized the close of the last century, as to the conveyance of many diseases through the medium of common insects, *e.g.*, malaria, yellow fever, typhoid, the bubonic plague and other diseases of mankind, and also of Texas fever and other diseases of domestic animals, have opened up another field of useful investigation which has inseparably linked together entomology and medical science.

During the past summer subsequent to our summer meeting, I had the privilege of travelling through our Northwestern Provinces with Dr. Henry

Skinner and listening to a series of lectures given by him upon the transmission of disease by insects. These lectures evoked the keenest interest from the large audiences who heard them, and there were many expressions of surprise at the intimate relation which was shown between the prevalence of some diseases and the occurrence of such common insects as house flies, fever mosquitoes, bed bugs, fleas, ticks, etc.

In this connection we, as Canadians, must read with great pride the accounts of the excellent work which is being done by Dr. Todd, of Victoria, B.C., and Dr. Allan Kinghorn, of Toronto, in connection with the School of Tropical Medicine, at Liverpool, England. The last named is now in Africa, on an expedition to the Zambesi, having been specially selected to investigate the fatal sleeping sickness and allied diseases, which are conveyed by insects. No less noteworthy are the investigations of animal diseases, which are being carried on by Drs. Higgins, Hadwen and Watson, under Dr. Rutherford, the Veterinary Inspector General of the Dominion.

From a consideration of the facts above cited I cannot but feel that the outlook for entomology and for entomologists is brighter than it has been for many years. The study of insects is now recognized as a useful branch of knowledge which affects materially the prosperity, comfort and health of mankind. This is attested by its introduction into the curricula of many colleges and schools and the appointment of Professors to instruct those who desire to learn about insects.

In Canada we have many good workers connected with our Society, or working alone, who are year by year adding to the mass of scientific knowledge concerning Canadian insects. This knowledge is increasing rapidly and is being placed on record for future use. Our society contains in its membership a large number of enthusiasts, and I am pleased to know that the publication of the annual Entomological Record in our reports has to some measure fulfilled its designed object, in encouraging and bringing into communication with each other and with specialists, many scattered workers in distant parts of Canada, who, by learning what others were doing, were enabled to be mutually helpful to each other.

As indisputable evidence of the value of this knowledge, it was pointed out by the Editor of the *Canadian Entomologist* in the issue for May last, that the Government of the United States, (of perhaps the most practical people in the world) passed appropriations for entomological purposes for the fiscal year ending June 30th, 1908, of upwards of $650,000, made up as follows:

For Bureau of Entomology, Washington.....	$136,000 00
Emergency appropriations:	
Cotton Boll Weevil investigations	190,000 00
Prevention of spread of Gypsy and Brown-tail Moths..	150,000 00
Eradication of Cattle Ticks	150,000 00
	$626,000 00

and, in addition to this, part of another appropriation of $250,000 for the National Museum is devoted to the care of the insect collections, in which work several officers are permanently employed. A proportion of another vote is used for the printing of bulletins, special reports, etc. These objects will certainly take at least another $24,000, making a gross amount of about $650,000, appropriated in a single year to study and fight insects.

Now, this large expenditure is only justifiable because it is believed that commensurate benefits are received in return. This brings me to the last

part of my subject, which I think is of keen personal interest to many present here to-day. If any of you, and doubtless there are some, think of making a serious study of entomology, that is to take it up as your life's work, there are several things which must be considered very carefully. The first, undoubtedly, is, Are you so keenly interested in the work as to enable you to excel? This is no easy matter. In the first stage of study, everything examined is strange, attractive and interesting; but then comes a long stage of close patient study and hard work, which love for the subject alone can carry you through. After this comes the reward in the shape of the delight of making new discoveries and learning more and more of the underlying principles of the science in all its branches, so that, when occasion arises, you may be able to take advantage of favourable opportunities for securing remunerative work. Moderate attainments are of little value in making a living. To be successful you must be, at any rate, just a little better than your fellows. Success must always depend on excellence; and, to attain this, thoughtful consideration and methodical application are as necessary as patience and hard work. All work undertaken should be done as well as possible, for your own sakes and for the work's sake. I believe it should be a principle with everybody never to strive for what is called "credit". Credit can never be gained by direct attack or by self-advertising. Fame which is the same thing, is a fickle godess who comes unsought and, if dragged in against her will, is in such a sulky mood that she is not worth having. Good thorough work will always demand and will always receive recognition. Strive to have your work as perfect in every detail and as conclusive as you can render it; and, above all things, aim to avoid the rocks and whirlpools of unproved theory.

Owing to the rapid development of economic entomology, new openings are being constantly created; and, as a consequence, there will be keen competition among the whole army of young men now training themselves to compete for these prizes. I know that there are openings to-day for well-grounded and mentally well-equipped entomologists. The demand for such men is increasing, and in the near future there will be further opportunities in many lines of work which to-day are not dreamed of. The best prepared will naturally gain the greatest prizes. The one desideratum is efficiency. A knowledge of insects alone is not sufficient to make an efficient practical entomologist. There are many necessary factors for such an official; for instance, he must be an enthusiast and should not only possess a general knowledge of all the different order of insects, but should have a special knowledge of some one or more; he should be well grounded in the elements of animal life and plant life and must have at least a working knowledge of the first principles of agriculture and horticulture, besides being fairly familiar with the botany of the locality where he does most of his work. A good knowledge of the English language is also most essential, so as to acquire a habit of expressing simply and clearly but in a succinct manner whatever information it may be necessary to communicate to the public.

Those of you who are in attendance at this well organized College, have special advantages of an exceptional nature, of which you should use every endeavour to avail yourselves to the fullest possible extent. You have Professors thoroughly qualified and eminent in their own subjects. In your Professor of Entomology especially, you have a man who perhaps has done more in Canada than anyone else to build up and establish on a firm basis the science which we have met here to-day to discuss, a man who, so capable in teaching, is also so genial and courteous that it is always a pleasure to meet him and a delight to be associated with him. You have around you extensive and beautiful grounds in which you can study insects and the

plants with which they are associated, as well as birds and other members of the animal kingdom. You have a comfortable, convenient and well equipped museum, and also the use of the extensive collections and valuable library of our Society. With such opportunities what should you not achieve? The College you are attending, is in many ways the very best of its kind in America or in the world. Think of this and remember it. It is an easy matter for the men gathered together under its shadow to honour their alma mater. May it be always their highest ambition to honour her and to be an honour to her.

CONFERENCE ON FRUIT-TREE INSECTS.

The main pests discussed were the Fruit-tree Bark Beetle or Shot-hole Borer, the Codling-worm, the Oyster-shell Scale and the Woolly Aphis.

Mr. L. Caesar, of the Ontario Agricultural College, opened the discussion on the first named insect by relating some observations he had made on its ravages in the Niagara district. His account was as follows:

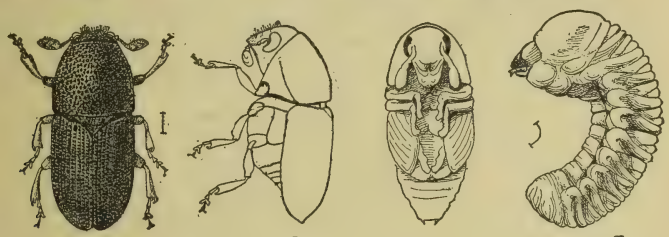

Fig. 1.—*Scolytus rugulosus:* *a*, adult beetle; *b*, same in profile; *c*, pupa; *d*, larva—all magnified about 10 times. (U. S. Dep't. of Agriculture).

Fig. 2.—Work of *Scolytus rugulosus* in twig of apple—natural size. (U. S. Dep't. of Agriculture).

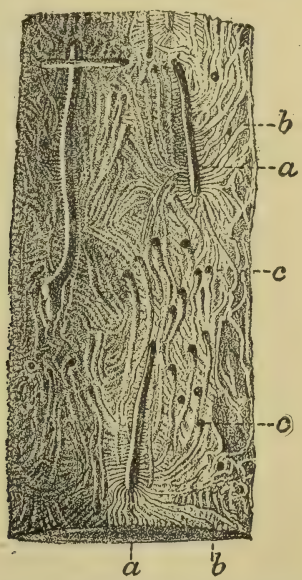

Fig. 3.—Galleries of *Scolytus rugulosus* on twig under bark; *a*, *a*, main galleries; *b*, *b*, side or larval galleries; *c*, *c*, pupal cells—natural size—(after Ratzeburg, from U. S. Dep't. of Agriculture).

The Fruit Tree Bark Beetle (*Scolytus rugulosus*).

In August last (1907), while acting as assistant entomologist in the temporary absence of Dr. Bethune and Mr. Jarvis, I received a letter from Mr. Geo. Olmstead, of Grimsby, asking whether I knew of a blight that attacked cherry trees. In response to a request for samples of the affected leaves and twigs, Mr. Olmstead sent me as many as he could put in a large envelope. These were examined for fungus diseases and some were also sent to the Bacteriological Department to be tested for bacteria. No fungus or bacteria were discovered to be present. Accordingly I wrote to Mr. Olmstead and told him that I should be making a tour of the Niagara district in a few weeks to investigate the results of the lime-sulphur wash, and would call and try to discover what was the cause of the injury to his cherry trees.

On September 23rd, I went to Fruitland and in the course of my regular investigations visited many prominent fruit-growers. I asked each of these whether any of their cherry trees had shown any signs of disease. Most of them said that they had observed the leaves of some at least of their trees withering up and dying, but did not know why. On investigation we found that the trees that had been healthy last year and the early part of this year, but that were now dying, were thickly dotted in most cases with gummy exudations, varying from the size of a pea to half an inch or more in diameter. On removing the gum from a number of these places we found clear evidence that some insect had bored a tiny hole through the bark in each case and that it was from these wounds that the gum had exuded. On further investigation we found a number of the insects themselves. These I identified as Fruit-tree Bark-beetles (*Scolytus rugulosus*), Fig. 1. They were about one-tenth of an inch in length, and about one-third that amount in width, were nearly cylindrical in shape and black in color.

A number of orchards were visited in the following localities: Fruitland, Winona, Grimsby, Jordan, Vineland, and St. Catharines. In nearly all of these the beetles were found attacking not only dead and diseased trees, but also trees that had been perfectly healthy hitherto. In some orchards nearly half of the cherry trees were severely attacked, in others only a very few trees.

The attacks were not confined to any one variety of cherry tree, for both sweet and sour varieties were assailed. In one orchard, however, where Montmorency and Richmond trees were side by side, the Richmonds were much injured while the Montmorencies were left untouched

The only other tree besides the cherry on which I found the beetles were a few plum trees in the St. Catharine's district. Two of these especially were very badly covered with gum and were practically past recovery.

On examination of the habits of the beetle, it was found that they seemed in most cases to have attacked the dead or weak trees first and to have spread from these to the healthy ones. This, I find, is in accordance with the regular accounts given by different writers on the subject. In their attack upon healthy trees the beetles did not confine themselves to any set order of procedure but apparently were just as likely to assail twigs or small branches as the trunk.

On the trees where the gummy exudations were, I examined a number of the holes from which the gum had exuded, expecting to find larvæ present, but in no case did I find any. It looked as if the attacks were made with the intention of causing the tree to die and thus become a proper place for egg laying. Larvæ, however, were found in considerable numbers under the bark of dead trees. The surface of the wood in such cases, when the bark had been

removed, was engraved with numerous little channels running in different directions but not going deep into the sap-wood. (Figs. 2 and 3). It was in these channels that the larvæ (small, legless, white grubs) were found (Fig. 1 *d*), often more or less concealed by the sawdust-like castings. The holes leading through the bark of such trees into the wood were small and such as would be made by fine shot (Fig. 2); hence the beetle is often called the "Shot-hole Borer." This sort of hole on dead or almost sapless trees and the gummy exudations on healthy trees make the presence of the beetle in an orchard easy to discover. That the insects were still at work late in September was evident from the number of adults discovered and the fresh castings at some of the holes. In one of these holes I found eggs but whether laid by a beetle or some other insect I could not say. I find, however, that some writers state that the winter is passed both in the egg and larval stages. I have not been able to find a reliable account of the life-history of the insect, but it looks very much as if there were more than one brood in a season. I should have mentioned earlier that the first evidence that the cherry tree leaves were beginning to die was about August 1st.

When asked by the fruit-growers what could be done to check the beetles, I told them that the plan ordinarily recommended was to cut down all dead, dying, and badly infested trees and burn them. I said that I believed that spraying was also resorted to as a preventive, but that having had no experience with fighting this insect myself, I should bring the question up at the Annual Meeting of the Entomological Society and endeavor to discover the best method to be pursued in fighting it, and would then send full particulars to the newspapers of the different districts.

Dr. Fyles: Is it possible for such a small insect to do so much injury?

Dr. Fletcher: Yes, quite possible. We should like to know the life history of the beetle better to be able to give more definite methods of treatment. The first thing to do, however, is to cut out and burn all dead and dying trees and branches. No branches pruned from any kind of tree should be left in brush heaps to become a breeding centre. Any wash applied must necessarily be in the form of a deterrent on account of most of the insect's life being passed under the bark. Carbolic washes have given satisfaction in some places; they are applied in spring.

Mr. Caesar: The State Entomologist of Georgia thinks that lime-sulphur carefully applied in late spring should be equally good.

Dr. Fletcher: Possibly. It looks as if lime-sulphur were being considered a panacea for all ills. It is helpful in so many things that we may be expecting it to do everything for us.

Mr. Jarvis: A few of the Fruit-tree Bark-Beetles are to be found in nearly every district each year on dead fruit-trees, such as cherry or plum. Some healthy apple-trees near here which are badly infested with the Oyster-Shell Scale have been attacked.

Dr. Fletcher: It is important to know that Mr. Caesar's observations go to show that healthy trees may be attacked. It used to be thought that it was only diseased or dead trees that were infested. It is from the latter kind of trees that the beetles spread to the healthy ones. According to Webster this Scolytus follows bad attacks of the San Jose Scale; it has been very abundant at Leamington where the scale is common.

The Codling-Worm.

Mr. Caesar: I cannot help feeling particularly interested in this question of the Codling-worm. I saw its ravages in the apple orchards of the Niagara district last year and again this fall. I believe that the damage

done this year is even greater than that of last year. I visited a good many apple orchards from Fruitland to St. Catharines and I believe that fully 50 per cent. of the apples were rendered unmarketable by worms. Strange to say, comparatively few pears were injured, not more, I think, than 5 to 10 per cent. where the trees had been sprayed with poisoned Bordeaux mixture. The damage to apples, however, was most discouraging. I cannot help feeling that the farmers do not know how to deal with the pest. Some of them use poisoned Bordeaux and bandage their trees as well and yet have simply hosts of Codling-worms. It may, of course, be that the spraying is not done at the right time and that the bandages are either not properly put on, or not opened and the worms taken out so frequently and thoroughly as is necessary. Something will have to be done or else farmers will give up apple growing in that district. I know one man who will have from 8,000 to 10,000 barrels of apples this fall, but of these fully 4,000 barrels will be unfit to put on the market, simply on account of the Codling-worm.

Prof. HUTT: The Codling-worm has certainly been very bad this season in the Niagara district and the remedies applied are not sufficient. The fruit-growers do not seem to know how to fight the pest.

Mr. JARVIS: I do not think many of the farmers bandage their trees, and some who do fail to remove the bandages once every ten days as they should.

Dr. FLETCHER: Great care should be taken to see that all the worms under the bandage are destroyed each time.

Mr. CAESAR: This is greatly facilitated by the trees being scraped in the winter.

Dr. BETHUNE: Do the farmers gather up the fallen apples each day and destroy them, or sell them to cider factories?

Mr. CAESAR: There are many orchards where the fallen apples are not gathered; in fact I think that in none of the orchards is this done daily.

Dr. BETHUNE: Could they not in some cases let their hogs or sheep run in the orchards?

Mr. CAESAR: Most of the orchards are not fenced, and very few hogs or sheep are reared.

Dr. FLETCHER: If the fruit-growers will spray with poisoned Bordeaux at the proper times and will put bandages on when the worms are beginning to emerge from apples, and remove these at least every tenth day and destroy the worms underneath, they will control the Codling-worm. At Ottawa we have had no Codling-worms in our orchard on the Experimental Farm for ten years because regular spraying has been done; and even in districts where there are two broods similar good results can be obtained.

Mr. CAESAR: Do all the worms that fall to the ground in the apples, or otherwise, find their way up under the bands? Do not a large number hide under lumps of earth or any kind of refuse or shelter on the ground?

Dr. FLETCHER: Many of course will get under the bark below the bandage, unless it has been scraped; some will hide under loose bark around the base of the tree or under boards, but I do not think any pupate under lumps of earth or among grass, at least I have never found any.

Apple growing in the Niagara district is not considered so remunerative by the fruit-growers there as the raising of peaches and other kinds of fruit, so that there has been a great deal of neglect of apple orchards, with the natural result that every opportunity has been given to the Codling-worm to increase at a very rapid rate, and even where one farmer looks after his orchard well, the neglect to do this on the part of his neighbor prevents satisfactory results being obtained.

Mr. JARVIS: I should like to call the attention of the members to the fact that the O. A. College orchard has been carefully sprayed this year at the proper time in the spring, and twice later on in the season at the usual intervals, and very few, not more than 5 per cent. of the apples are wormy. We have not a full second brood here but have about 15 per cent. of a second brood in ordinary years. A few trees on the campus that were not sprayed had almost every apple wormy. One could scarcely want clearer evidence of the value of spraying.

THE OYSTER-SHELL SCALE OR APPLE-TREE BARK LOUSE.

Prof. HUTT was asked by the chairman to open the discussion on this subject. He related his observations in different parts of the province and stated that last year had been a very favorable one for the increase and spread of this scale, and that this year he had heard many reports of its great abundance, especially in the counties of Northumberland and Ontario. He thought it was doing a great deal of injury to fruit trees, especially apple trees all over the province

A MEMBER: Are many other kinds of trees attacked by this scale besides apple trees?

Mr. JARVIS: We have found it at Guelph on apple, pear, plum and cherry trees; on currant, gooseberry, rose, spireas and lilac, and also on numerous forest and shade trees, such as mountain ash, hawthorn, red-osier, dogwood, basswood, both black and white ash, American aspen, horse-chestnut and mulberry trees.

Mr. CAESAR: I think that from what I have seen this year there will not be half the number of Oyster-shell scales next year that there were last. The scale-lice hatched out all right this June and the branches of many trees were almost covered with the young. I examined some of these same trees a few weeks ago and found that the great majority of the young scales had not lived through the season, but had died when only a few weeks old.

Dr. BETHUNE: Some experiments that have been made with lime-sulphur wash seemed to show that it is not entirely satisfactory as a remedy for this scale, though it destroys a large number of them.

Dr. FLETCHER: It is not usually considered a perfect remedy for Oyster-shell scale.

Mr. CROW: I sprayed a few trees here with the ordinary kerosene emulsion, and some others with the flour-kerosene mixture. The spraying was done just when the young had hatched out and were moving over the branches. The results were very satisfactory. I can bear out the statements made as to the prevalence of this scale throughout the province and the vast injury it is doing, but I agree with Mr. Caesar that from some cause, whether it be the late spring and cold weather after the young emerged, or whether it was owing to rains at that time, there seems to have been a very great diminution in the number of living scales this fall.

Mr. NASH: My experience makes me agree with what has been said in regard to the decrease this year in the number of scales. This spring I noticed one of my trees late in June swarming with young scales. I examined the same tree not long ago and was amazed to find scarcely a living scale on it.

Dr. FLETCHER: This is not the case in all parts of the province. I was interested in Mr. Crow's remarks about the success of the kerosene emulsion and flour-kerosene sprays. These may be considered the standard remedies against the Oyster-shell scale.

Mr. CAESAR: The orchards in the Niagara district, that two years ago were badly infested with Oyster-shell scale and were sprayed last year and again this year with lime-sulphur, seem to be quite clear of this scale.

Dr. FLETCHER: Wherever an orchard is sprayed year after year with lime-sulphur or even with Bordeaux mixture, the Oyster-shell scale gradually ceases to trouble. I have always found, moreover, that the healthier you can make your trees, the less likely are they to be badly attacked by Oyster-shell scale. Lime-sulphur helps the tree to be healthy.

Mr. CAESAR: I found that in some orchards almost 50 per cent. of the scales were parasitized by a tiny yellowish four-winged fly (a Chalcid). Mr. Jarvis and I raised a number of these parasites this spring.

Dr. FLETCHER: I have seen a case where 80 per cent. were parasitized, but I am sorry to say that the parasite does not work in all parts of the province, as it is only locally abundant.

Mr. CROW: Mr. Dempsey, of Trenton, thinks the parasite has controlled the scale in his orchard.

Mr. JARVIS: A fungus is also attacking the scale. It is of a pinkish orange color, and probably is the same one that attacks San Jose scale. I found it on some specimens of Oyster-shell scale sent to me recently. It is also found at Guelph.

Dr. FLETCHER: That is very interesting. I have found this fungus in one or two places but not in Ontario. If you possibly can you ought to try to spread the fungus, Mr. Jarvis. Try inoculating oyster-shell scale and San Jose with it in different orchards. Valuable results might possibly be obtained, at any rate it is wise to try it.

Mr. JARVIS: We have also found a tiny little mite that destroys the eggs. I have seen the statement made that it does not destroy them, but my experience, I think, justifies what I have said. The eggs where these mites were found in the spring were nearly all destroyed, or in some cases were brown in color and clearly never could hatch. In our class work, when examining the scales under the microscope, we have found a large number of scales with these mites in them.

Dr. FLETCHER: We have then three friends to help us in fighting this scale, namely, the four-winged chalcid fly, the mite, and the fungus.

THE TERRAPIN SCALE.

A very brief discussion of this much talked of scale (*Eulecanium nigrofasciatum*) took place :

Dr. FLETCHER: Have any of you had definite information that a satisfactory remedy for the Terrapin scale has been discovered?

Mr. JARVIS: I have not seen the results of any work on the scale further than the statement that lime-sulphur would not kill it.

No one else had any experience with remedies to relate, so Dr. Fletcher said that he had been informed, or had seen a statement that kerosene emulsion utterly failed to kill the insect.

Dr. BETHUNE: The scale has only been reported from three places in Ontario, viz., Walkerville, Windsor and St. Catharines. It does not seem to be spreading. Only maple trees were attacked.

Dr. FLETCHER: What remedy did you recommend?

Dr. BETHUNE: I recommended that the trees shoud be cut down and burned, which was accordingly done.

The Woolly Aphis.

Prof. Hutt brought up the subject by remarking that the Woolly Aphis was very abundant this year in some districts.

Mr. Jarvis: I should think it was. In the orchards around here nearly every young tree has every little crevice or wound on the bark filled with them.

Mr. Crow: I have noticed that they are very bad in the College orchard, but I do not think they have injured the trees much.

Dr. Fletcher: When did you notice that they were numerous? Was it in summer or autumn?

Mr. Jarvis: In autumn.

Dr. Fletcher: Has anyone ever found the Woolly Aphis in the root form in Canada? Personally I never have, though it is found in the United States and does much injury there.

Mr. Frier: When we were taking up some young conifers in the Forestry Department this year, we found a great number of Woolly Aphids among the roots. Would these be the kind you refer to?

Dr. Fletcher: No, these are a different species. "Woolly aphids" are found on many kinds of trees and there are many different species.

Prof. Hutt: It is very interesting to see the chickadees eating these insects. They seem to devour them with great relish, and soon destroy a great number of them.

Bees and the Yield of Fruit.

Prof. Hutt: I should like to call the attention of members to the lack of bees for fertilization this year. I am told that in many districts nearly 80 per cent. of the bees perished during the winter or early spring. Added to this the fact that during the blossoming season we only had a few really good days for the bees to work. I believe it was owing to this that so small an amount of fruit set this year, smaller than usual. I firmly believe that fruit-growers should keep more bees. I notice that men who keep bees have a better set of fruit. Mr. Dempsey, of Trenton, is a good example of these men. He has bees and never fails to get a good set of fruit.

Dr. Fletcher: I am glad you brought this subject up. Mr. Macoun, of the Experimental Farm at Ottawa, called my attention to the splendid crop of apples we had this season, whereas the apple crop for miles around Ottawa was almost a failure. The only explanation I can find is that we had bees to help us and other people had not.

Prof. Hutt: Do wild bees assist to any extent in the fertilization of fruit blossoms?

Dr. Fletcher: Certainly, but not to the same extent individually as the honey bee. The latter seems to be especially built for this purpose. He seems to delight in getting covered all over with pollen and conveying it from one blossom to another.

Dr. Brodie: Many families of wild bees do a great and excellent work in fertilization; especially is this true of the great family Andrenidæ, of which there are about 100 species; the Syrphidæ and Halictus, also, do good work in fertilizing fruit blossoms.

San José Scale.

A short discussion on this scale was brought about by the reading of the following letter from Mr. J. Fred. Smith, San José Scale Inspector for Ontario:

"One of the most noticeable things in connection with the San José scale this year was the lateness of the commencement of the breeding season; and owing to the lateness of the spring in opening large numbers of them starved to death. Another peculiarity therewith was that this was most noticeable on heavy cold soils. On the warmer and earlier soils they have done fairly well. In other words in all those sections where early gardening is done and where vegetation started early the sap also began to flow earlier, and as this is their food they were consequently started in their work of destruction in good shape.

"I am also pleased to inform you that never before was there so much treating done for its destruction. Lime and sulphur was the almost universal remedy and so much sulphur was used that there was a sulphur famine. At Leamington, towards the last of the season, none could be got at all. In village and small town lots considerable Target Brand and Carlson's Mixture was used, but on account of the large quantity of scale that were winter killed it was almost impossible to form an opinion as to their value. At Leamington I made an inspection, along with the local Inspector, of several lots treated with Target Brand, and as I was not then aware of the large quantities winter killed I had to give the Brand credit for doing the good work; but later I found some lots that had not been treated at all and there was very little life to be found. The examination at Leamington was made on the 5th of July. On the 30th of July, at Bartonville, on trees which had not been treated for the scale larvæ were to be found running, which is the latest that I have ever seen in Ontario."

Miscellaneous.

The remainder of the time set apart for the conference was employed in discussing a variety of insects, respecting which information was desired. For the potato flea-beetle it was stated that Bordeaux mixture had proved to be the best remedy, and also for that attacking cucumbers; poisoned-lime is useful for the grape-vine flea-beetle and is made with Paris green and lime so thick that it can only just be sprayed. For the oyster-shell scale the lime wash (made in proportion of one pound of lime to a gallon of water) has proved entirely satisfactory. It should be applied in the autumn as soon as the leaves have fallen, and be repeated a few days later. Two applications of this thin wash are more effective than a single one made with double the amount of lime. For slugs attacking celery, freshly slaked lime was recommended, to be put on before hilling up the plants, and repeated for two or three days in succession. The lime sticks to the slimy bodies of the slugs and kills them through its caustic effects.

Mr. W. R. Thompson mentioned that millipedes attacked tomatoes in large numbers at Ste. Anne de Bellevue this summer, especially injuring any fruit that touched the ground. The chairman advised as a remedy a dressing of nitrate of soda.

REPORTS ON INSECTS OF THE YEAR.

Division No. 1,—Ottawa District. By C. H. Young, Ottawa.

During the past season I regret to say I have been unable to devote as much time as I should have liked to the study of the insects of the Ottawa district, which have appeared in destructive numbers.

The following notes, however, are submitted:

The small White Cabbage butterfly (*Pontia rapæ*), was very plentiful in the district and its ravages in neglected gardens could be easily seen. It was particularly troublesome towards the end of August. On August 22nd I visited a large garden at Billing's Bridge, near Ottawa, and here the injury was to cauliflowers. The insect-powder remedy is such a simple one that I cannot understand why growers of cabbages and other plants which are attacked, allow this insect to destroy their crops.

The Colorado Potato beetle (*Leptinotarsa decemlineata*) was particularly abundant in many potato patches. Although the season was a poor one for potatoes, those growers who sprayed with the poisoned Bordeaux mixture were well rewarded.

Grasshoppers were very numerous at Meach's Lake, Que., near Ottawa. In one garden of a friend of mine all the flowering plants were completely destroyed, while in another large garden about half a mile away flowering plants were saved by allowing chickens to run in the garden. This is another instance of the value of poultry in reducing the numbers of injurious insects.

When these domestic animals once acquire the habit of feeding on grasshoppers and cutworms, they become of so much more value to the owner. At Billing's Bridge grasshoppers were also noticed injuring cauliflowers and other crops of vegetables.

The Fall Webworm and the Yellow-necked Apple-tree caterpillar appeared in considerable numbers and their injuries were very apparent throughout the district. Where these insects were troublesome on shade or ornamental trees, the simple remedy of cutting off the infested branches was resorted to. Halisidota caterpillars of two species, the Hickory Halisidota (*Halisidota caryæ*) and the Spotted Halisdota (*H. maculata*) were responsible for much injury to the foliage of many trees and other plants in late August and early September. At Rockliffe Park, near Ottawa, the caterpillars of the Spotted Halisidota were abundant on willows, basswood and Wild Rose.

Several colonies of the Black Walnut worm (*Datana integerrima*) were observed as very destructive to cultivated Black Walnuts and Hickories. This insect, however, cannot be usually considered an injurious one at Ottawa as it does not occur in sufficient numbers to do serious damage. Cutworms, while troublesome in some gardens, were not responsible for very much damage, as far as I know, in the district, during the past season. The poisoned bran remedy is becoming more widely used every year.

Root Maggots, too, were not in such numbers as to cause much anxiety to market gardeners during the season of 1907.

Division No. 2.—Midland District. By C. E. Grant, Orillia.

The year of 1907 was a remarkably backward season; on the 27th of May I walked home in half an inch of snow and the wind blowing a blizzard, then a short three months of summer which was excessively dry.

No very serious complaints of insects were reported to me.

There were, however, widespread complaints of the Buffalo-beetle, which has apparently invaded most houses and no efficient remedy seems to have been found or else the remedy is not properly applied.

The currant saw fly and the codling moth were also very bad this year and the apples here (in fact most fruits) were small, therefore the crop was poor. The cutworms were also rather plentiful.

Though perhaps not doing much damage, the Walking-sticks were to be met with very often and lots of people brought them to me, who before would have been ready to swear that there was no such insect in existence.

Grasshoppers were very plentiful late in the season and devoured a lot of the leaves which were left after the drouth.

Late in September immense numbers of the Buprestid (*Chrysobothris femorata*) were running over the cement walk of the main street and were crushed by pedestrians. I tried to trace the source of the supply but could not.

The Fall Web-worm was very much in evidence. I also noticed the remarkable number of Halisidota and Acronycta or Apatela caterpillars; they were all over the fences and until quite late in October. I took two specimens of Telea polyphemus in August, quite an unusual occurrence.

I have only added one new moth to my locals this years, viz., *Plagodis keutzinzii*.

Division No. 3.—Toronto District. By J. B. Williams, Toronto.

The Tussock Moth still continues to do a good deal of damage to the shade trees in Toronto, though they have not been quite so numerous this summer, as far as I have observed, as they were a year ago. The comparatively cool weather may have acted to some extent as a check upon their numbers, or possibly parasities are beginning to get the upperhand, and we may see their gradual diminution by natural causes, during the next few years. They have certainly appeared for some time past to be having everything their own way.

The Tent caterpillars have been numerous round Toronto, and I saw a good many of them in the country round Lake Simcoe.

The Codling Moth has been very destructive to many apple trees in the city gardens. In the same orchard some trees have hardly been touched by them, while others have had almost every apple more or less injured by the ravages of this injurious pest.

Though the Walking-Stick insects were very numerous last year at Niagara Glen and swarms of them had stripped several large trees of their foliage, I failed, this year, to find a *single specimen* on two or three occasions when I visited the place. What can have been the cause of their sudden disappearance?

Division No. 4.—East York District. By C. W. Nash, Toronto.

The past season seems to have been an unfavorable one for the development of most forms of insect life. Butterflies were particularly scarce, even the common species which usually swarm about the garden and over fields of blossoming clover, being conspicuous by their absence. I did not see one Monarch Butterfly (*Anosia archippus*) until the first week in August, after which a few were noticed every day, but so far as I could observe, there was no congregation prior to migration, and no regular flight in September such as usually takes place along the shore of Lake Ontario from east to west, when the insects are on their journey to the south. On the other hand many were here later than usual; a few having remained until October, 5th, when the last were seen.

Cosmopepla carnifex.—During the past few years this beautiful little hemiptera has been gradually increasing in numbers until in June, 1907, it became enormously abundant on Aquilegia, Antirrhinum and Pentstemon

in gardens. On the 25th of June all the plants of these genera in this neighborhood were covered with the insects and a vast number of eggs had been deposited upon the main and flowering stems of the plants. I was curious to know what would happen when all the eggs were hatched for it seemed as if they would produce enough insects to over-run the country. Apparently the season was unsuitable for the development of the nymphs or one of the many disasters to which "feeble folk" are subject overtook them, for by August there were no Cosmopeplas to be seen. The millions of adults which appeared in the spring had all passed away and there were none of their progeny to represent them.

I have not yet been able to discover what this insect feeds upon. As it resorts to Aquilegia, Antirrhinum and Pentstemon and upon them its eggs are deposited, it would seem that these plants should supply its food. Yet although hundreds of adult and immature Cosmopeplas may be upon a plant, no perceptible harm is ever done to it, and all my efforts to raise the nymph from the eggs have proved abortive, though I kept them well supplied with shoots from the plants upon which the eggs were deposited. I tried them also with Aphides under the impression that perhaps they lived upon the juices of other insects, but this too was a failure.

Locusts.—Just before harvest time locusts became troublesome in the oat fields, where they did some damage by cutting off the ripening grain from the stalk and dropping it to the ground. In some fields the soil was covered with the grain so cut off. Under ordinary circumstances the loss would be somewhat serious, but this year, owing to the short crop, is doubly so.

The Stalk-borer (*Gortyna cataphracta*).—Perhaps the worst enemy vegetables growers and florists have to contend with now is the larva known as the Stalk-borer. This creature has increased rapidly in numbers during the past five years and unless it is checked by some of its natural enemies will cause great loss and annoyance, as it is almost impossible for man to control it by any mechanical means. During this past season I took over two dozen larvæ from the stems of plants in my garden of about a quarter of an acre and I received great numbers from market gardeners and florists both amateur and professional of this district. It is practically an omnivorous feeder, any plant, either wild or cultivated, having a stem large enough to contain it being liable to attack and unfortunately the infested plant shows no sign of infestation until the larva has eaten out the heart of the occupied stem. When this occurs the stem breaks off or its leaves wither and die. If it is the main stem which is occupied, as is generally the case with tomatoes and corn, the plant is ruined.

I have not yet been able to ascertain where or when the moth deposits the eggs from which the larvæ are produced. It might be that the moth hibernates and deposits its eggs upon the shoots of plants in the spring, but I have not yet found an adult dormant, nor have I seen it in the spring.

In July the work of the larvæ is first noticeable, and a rather peculiar thing is that, almost up to the end of the month, larvæ varying in size from about one-third to full grown may be found in close proximity; this year I found on the fourteenth of July a number showing among them even greater variations than that.

About the twenty-fifth of July the more advanced specimens begin to enter the pupal stage, the smaller ones continuing to feed sometimes well on into August. Early in September the moths begin to emerge and continue doing so until the end of the month when they are at the height of their abundance, and on dark nights come to light in large numbers. This year

they were rather later than usual and I did not see as many moths flying as in 1905 and 1906. In the latter year they were very abundant at light on the night of September 26th, which was dark and rainy.

Although I have bred a great many of these insects from the larval state to maturity, I have never found one parasitized and their method of life, no doubt, protects them largely from enemies of this class.

The Tarnished plant bug, though still more in evidence than was pleasant, did less mischief than usual, and Aphides, though rather abundant in spring, became less so as the season advanced. Dragon-flies were very scarce indeed, so much so that in the marshy meadows where they usually abound I did not see this summer, one for every hundred generally to be found in these localities. Bumble -bees also were far less numerous than they should be for the good of the country. Of the five or six nests provided by me for them, not one was occupied, though for the previous five years every one has been tenanted.

Division No. 6.—London District. By J. A. Balkwill.

In this neighborhood we have been fortunately, almost exempt from serious injury from insects with one noteworthy exception that was an unusually large number of cutworms which attacked almost every kind of garden vegetable even boring into onion stalks; one party tells of taking 30 off one tomato plant; the larvæ were nearly full grown and soon went into pupation.

The Cottony Maple scale which disfigured our maple trees for a number of years has almost entirely disappeared.

The Tussock moth we have in considerable numbers but not numerous enough to cause alarm.

Nothing is heard about the Pea Weevil although an occasional one is found in the peas which were sown early.

After these reports were read, a short discussion followed, in the course of which Prof. Hutt said that the Rose Chafer was very injurious near Leamington this year. The English Sparrow had developed a taste for them and devoured great numbers. This is one point to be scored in favor of these birds. Mr. Cæsar said that he had been sent some specimens of insects from Toronto which were reported to be destroying almost everything in a garden. They proved to belong to the Fulgoridæ and were identified by Dr. Bethune as *Ormenis pruinosa*, Say. They seemed to be fairly numerous about Toronto and were found on tree trunks when he visited the city about the middle of July.

EVENING SESSION.

Thursday, October 31st, 1907.

In the evening Mr. A. H. Kirkland, of Boston, who is in charge of the efforts now being made in Massachusetts to suppress the Gypsy and Brown-tail Moths, gave a highly interesting account of the work and the results that have so far been accomplished. His address was illustrated with a series of lantern pictures which graphically showed how the operations are carried on. He described also the importation of parasites and some pre-

daceous beetles from Europe, and the amount of success which had so far attended their efforts to breed them. Dr. Fyles followed with one of his charming papers "The Voices of the Night." Much regret was expressed that the attendance was small owing to the attractions of the holiday, it being Thanksgiving Day and Hallowe'en

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THE GYPSY AND BROWN-TAIL MOTHS IN MASSACHUSETTS.

Abstract of Address by A. H. Kirkland, Supt. of Gypsy Moth Work, Boston, Mass.

After congratulating his audience upon the evidences of agricultural prosperity shown in the parts of the province through which he had passed, and speaking of the serious loss to agriculture often inflicted by injurious insects, Mr. Kirkland took up the matter of imported insect pests, and explained why they were so much more injurious to crops and trees than native insects.

"In a state of nature, every insect has its enemies, such as birds, diseases, and, most important, insect parasites. When an insect pest is transported thousands of miles to another country, and is thus freed from its natural enemies, it multiplies remarkably, and causes much greater damage than when in its native environment, simply because it is relieved from those checks which nature has provided for it. Thus the San José scale is much more injurious in this country than in its native home in Northern China. The Elm-leaf Beetle and the Gypsy and Brown-Tail Moths also give striking illustrations of this fact. These two moth pests have caused most serious havoc in eastern New England, have spread rapidly, and one, at least, the Brown-tail Moth, occurs in the Maritime Provinces of Canada."

The speaker then described the importation of the Gypsy-moth to Medford, Mass., by Professor Leopold Trouvelot in 1868, its accidental escape from his care, and its slow but constant spread throughout the neighboring towns. "Recognizing the importance of the catastrophe, Professor Trouvelot promptly gave notice to Doctor C. V. Riley, then State Entomologist of Missouri, and also to Doctor Hagen, at Harvard University. Unfortunately, no great importance was attached to the matter, although at this time $1,000 would have cut and burned over the many acres of brush land in the vicinity of Profesor Trouvelot's home and wiped out the incipient moth colony. The moth increased unrestrictedly for some twenty years, but in 1888 the public of Medford and vicinity suddenly woke up to the fact that they had a serious caterpillar plague on their hands, and at once made vigorous efforts to combat it. One year's experience was sufficient to show them that individual effort could not control this formidable pest, and the aid of the cities and towns was invoked. Another year convinced the cities and towns in turn that they could not fight the insect unaided, and the State of Massachusetts was asked for help. The work in Massachusetts began in 1890 and was continued until February 1, 1900, principally under the auspices of the Massachusetts Board of Agriculture. This work suffered in certain critical years from lack of sufficient appropriations, or from appropriations not made in season for most effective action. At the same time. great progress was made in bringing the insect under control, until in 1900 but few moths could be found anywhere in the infested region. The insect had been thoroughly suppressed

by the application of hand methods, so-called, many of which were invented to meet the needs of the work. In 1899 not over ten acres of woodland were stripped in the entire infested district, which embraced some 350 square miles. In 1900, although it was pointed out to the Massachusetts Legislature, that scattering moths remained here and there in the district, that body, in its wisdom, saw fit to discontinue the work, partly from political reasons, in spite of the protests of entomologists who thoroughly realized the gravity of the situation, because of the prolificacy of the moth. During this campaign about $1,250,000 was expended, and the moth had been brought thoroughly under control. The insect at once began to increase steadily, yet nothing more was done in the warfare against the moth pest until 1905, when the caterpillar plague had again become such a nuisance that the work was resumed under a co-operative plan whereby the citizens directly bear part of the expense of supressing the insect, cities and towns another part, and the State the major part. In other words, the present scheme of work involves a direct co-operation of property owners, cities and towns and the State, under the general direction of the central office, thus insuring uniformity of action. Under this scheme of work, upward of $750,000 was expended during 1906, and as much will be laid out the present year.

"The principal means by which the Gypsy moth is spread over its present area of some 2,800 square miles, is through caterpillars spinning down from the trees and dropping on automobiles, teams, cars, etc. Fortunately, the female moth does not fly but the insect spreads rapidly in the manner mentioned. A volume might easily be written on the means by which the Gypsy moth is spread. The young caterpillars spin down by thousands from neglected, infested trees in May and June. Where such trees overhang highways, every milkman, every grocer, every garbage man, in short, every vehicle gathers them and carries them to a greater or less distance, thus founding innumerable new colonies. In the badly infested district regular daily traffic of the classes mentioned above is most dangerous. Long distance scattering of the moth is effected principally by pleasure driving, electric cars, and what is most important of all, automobiles. The advent of the latter class of vehicles has greatly complicated the prevention of the spread of the pest, and makes it all the more imperative that we should keep clean the trees that border our main roads. Other minor methods of distribution are eggs deposited on barrels, packing boxes, summer furniture standing out of doors, etc.

"The Brown-tail Moth found its way to Somerville in the early nineties no doubt on rose bushes imported from Holland. The evidence in this case is circumstantial but strong. The insect is known to occur in Holland, is known to form hibernating webs on roses, and the place where it was discovered in Somerville, Mass., in 1897, was directly in the rear of a florist's establishment, where a specialty was made of importing Dutch roses, growing them for a season and then selling them to the Boston department stores. The female moths of this species fly freely, and are often carried long distances by the wind. They are also strongly attracted to light. Cases are on record where these strong flying females have come on board vessels some thirty miles off the New England coast. It is not surprising then that the Brown-tail Moth has already spread to Rhode Island, Massachusetts, Vermont, New Hampshire, Maine, New Brunswick and Nova Scotia. The line of spread is naturally that of the prevailing winds during July, which in New England usually blow to the north-east. It seems probable that in comparatively few years this insect may be found generally scattered throughout New England and Eastern Canada.

"The biology of the insects is briefly this: in the case of the Gypsy Moth the eggs hatch about the last week in April, the caterpillars, which feed on all kinds of foliage are full-grown about the middle of July. Words cannot describe the havoc wrought by these caterpillar swarms. In early July of the past year, some 3,000 acres of mixed woodland in Eastern Massachusetts were defoliated by the gypsy caterpillars, and left as bare as in winter. They feed on all trees, nearly all crops, and often invade houses by the hundred. No more pitiful and at the same time disgusting sight can be conceived than a gypsy moth outbreak at its height. No wonder that in the olden days before the science of economic entomology was dreamt of, people so afflicted sought a remedy through prayer, or that they regarded the pest as a device of the Evil One. The pupal stage extends to about the 1st of August, while the moths are from a week to ten days in depositing their yellow, hair covered egg clusters. The egg clusters are laid on tree trunks, stone walls, houses, fences, and old tin cans—in fact, in all places where the caterpillars may go to pupate. The female seldom moves far from the pupa case from which she has emerged.

"With the Brown-tail Moth the eggs hatch about the middle of August, and the young caterpillars feed at the tips of the twigs, preferably those of fruit trees, until the approach of cold weather, when they draw together the leaves from which the epidermis has been removed, and spin them up with a most tenacious web, thus forming a hibernaculum within which they congregate to the number of two or three hundred, and thus safely pass the winter. The same warm weather that causes the buds to swell the following spring brings out these small caterpillars, which feed on buds, blossoms, and leaves, and when abundant, often strip entire orchards and groves of oak. Aside from the damage to trees the hairs of the caterpillars are intensely poisonous and cause a severe and most painful eruption of the skin whenever they come in contact with it. By the middle or latter part of June, the insects are fully grown when they spin cocoons, often in masses at the tips of twigs, on fences, and even house walls. From the 12th to the 15th of July the white, brown-tail moths emerge, fly freely, mate principally by night, and the females at once begin the work of oviposition. Some four or five days are consumed in this process by which time the brown, elongated, hair-covered egg masses have been securely attached to leaves at the tips of twigs. Hatching takes place in from three to four weeks.

"For remedial measures against the Gypsy Moth we have found spraying done in the early caterpillar season the most valuable of any single method. Power sprayers, throwing the spray under heavy pressure have proved the most economical, as far as street tree and orchard work is concerned, and also, in those woodlands which are accessible to heavy machines. In woodland spraying, however, the thinning of trees, and cutting out of underbrush is an indispensable prerequisite, and this preliminary work is usually done during the previous fall and winter months. In spraying against the Gypsy Moth, arsenate of lead paste at the rate of 10 pounds to 100 gallons of water gives the best results. On rough or rocky hillsides, and in other places where the power sprayer cannot be worked to advantage, hand spray pumps are freely used with good results. As the caterpillars approach maturity, they show considerable resistance to poison, and further acquire the odd habit of feeding by night and hiding by day in sheltered places. Taking advantage of this habit we band the infested trees with strips of burlap, beneath which the caterpillars assemble in the early morning hours, and where they may be destroyed at any time by hand during

the day. Later in the season, the pupæ and female moths are crushed by hand or creosoted wherever found, while after the eggs are laid coal tar creosote applied with a brush to the egg masses completely destroys them. This creosoting of the egg masses is carried on throughout the fall, winter and spring, and is a most effective though somewhat expensive method. In badly infested woodlands we thin the trees, cut the brush and treat the egg masses on the trees left standing. The following spring we band the remaining trees with some sticky material to prevent the ascent of the young caterpillars, and as soon as all the eggs on the ground have hatched, a light fire is run over it, thus destroying the caterpillars by the million. These are the principal methods directly used for destroying this insect. As a matter of policy we have attempted first to stop the scattering of the moth by treating a 100 foot belt on each side of all our main roads. This prevents the caterpillars from spinning down and dropping on vehicles. In this way, over 8,000 miles of roads have been covered during the present season. Next, we have endeavored to do the greatest good to the greatest number of our people by clearing all the important residential sections of the moth, and certainly 90 per cent. of them have been so cleared and protected. There now remains the great woodland problem concerning which we are most anxious, but which we can solve if given sufficient time and money.

"In combating the Brown-tail Moth the natural and most effective measure is to cut off the winter webs, gather them carefully and burn them. This work is best done when snow is on the ground. Where this has been neglected a spraying with arsenate of lead, six pounds to one hundred gallons of water early in the spring will suffice to destroy the insects. In actual field practice the winter work of cutting off brown-tail webs, and of creosoting gypsy moth nests goes on at the same time and with the same gang.

"In opening this informal talk I spoke of the balance of nature; and how injurious insects in their natural environment are ultimately held in check by their parasites. In Eastern Massachusetts we are endeavoring to secure this balance of nature in connection with the moth pests by the importation from Europe of the parasites of both moths. Our State has made liberal appropriations (some $45,000) for this work, which I have placed under the oversight and direction of Dr. L. O. Howard, Washington, D.C., than whom no one in the country is better qualified to direct. Dr. Howard has made several trips abroad for us and engaged a competent corps of collectors in all parts of Europe where the moth occurs. He has also given us the benefit of his advice at all times, and the services of one of his trained assistants who has spent nearly all his time in Eastern Massachusetts looking after the material when it arrives. We have provided for this important work a well-equipped laboratory, and a large number of assistants, and during the past year over 100,000 different forms of parasites of the moth have been bred from European material and liberated in our infested district. We have imported several important Ichneumonids, a very large number of Pteromalids, thousands of Tachinids, and also a large number of predaceous beetles of the genus *Calosoma*. When a sufficiently large number of any of these parasites is obtained at any one time they are liberated directly in the field. Otherwise, they are bred up to the requisite number in outdoor cages and then liberated. What the outcome of this exceedingly interesting scientific experiment shall be, is, of course, problematical. We know already that certain important imported species have established themselves in our State, and are hopeful that another season will show that many others have done likewise. At any rate, the best

available scientific skill is being brought to bear on the problem, while ample financial support has been provided by the State. Both Dr. Howard and myself are very hopeful for the successful outcome of this undertaking. If it can not be gained under present conditions, it can not be gained at all.

"While such great insect invasions are at first glance most discouraging, I am not one of those who regard them wholly as an unmixed evil. I believe that there is in them a certain element of benefit to the community at large. By the attacks of these hordes of insect pests we gain a better appreciation of the value of our trees and crops. We are led to study their needs more closely and to administer to those needs more thoughtfully and efficiently than before, and from thus getting in closer contact with a few forms of life our interests and sympathies become broadened in their relation to the whole living world."

VOICES OF THE NIGHT.

By Rev. Thomas W. Fyles, D.C.L., F.L.S., Levis, P.Q.

Eight years of my early life in Canada were spent in a very beautiful, but comparatively newly settled district in which there was much of the primeval forest remaining. Some of the first settlers were still living there when I took up my abode in the neighborhood. These men told of the nightly howling of the wolves on the hills when they first began to clear the lower lands, and of their encounters with various wild animals in the woods.

My duties at that time took me frequently from home, and my solitary return journeys were necessarily made at night. Driving on the mountain roads, and through the forest, and by the lakes and streams of the locality, I had fine opportunities for studying the "Night Side of Nature"—I use the words in a different sense from that in which Mrs. Crowe used them.

I pity the man who, living in the country, cannot find, at all hours, by day or night, in summer or winter, sights and sounds to interest and instruct him. I pity the man to whom

> "The gracious prodigality of Nature
> The balm, the bliss, the bfeauty and the bloom"

do not appeal. A solitary drive on a country road has always been to me an occasion for rich enjoyment. The many voices of animate creatures—aye, and by a figure, of inanimate objects, also, have formed for me, many a time, a concert well worth listening to.

To speak of the voices of inanimate things I shall never forget one glorious night when the Aurora Borealis held possession of the sky. From the zenith to the horizon, like the ribs of a vast umbrella, but streaming, quivering, vibrating, the rays descended on every side, I stood in admiration, and became conscious of a strange sound. Was I mistaken? I listened intently. I could hear the distant fall of the water over the mill-dam—it was distinct from that. It was like the gentle shaking out of a stiff piece of silken goods. It was a sound of which travellers in Arctic regions have told us—it was the voice of the Aurora.

Who is there who has passed through a grove of pines in the darkness but has noticed the slumberous sighing of the foliage shaken by the night air? I have often listened to it.

Turning now to the consideration of the notes of animate creatures—what a mournful cry was that of the Loon, or Great Northern Diver, as it passed from one sheet of water to another! It was a weird sound coming from far overhead in the stillness of the night, and soon to be answered, from near or far, by the cry of the companion bird.

Sometimes, in the spring or fall, it was very startling to the lonely traveller in the night to hear a—

"—rush as of harpy wings go by."

accompanied by a constant trumpeting of "*conk-conk*." Looking up, he would see a phalanx of dim forms speeding onward as if to charge an enemy. The sounds came from a flight of wild geese winging their way, to or from, their breeding-ground in the north.

And these sounds would, perhaps, arouse a fox, who would answer them from the hill-side with his short sharp bark.

In those days I often heard the rollicking hearty call of the Great Horned Owl, "*Wo-a-ho-a-hoa*," shouted from one mountain top, and answered from another by its mate.

Birds of this fine species were numerous in that neighborhood, and sometimes became so bold as to visit the farm yards. A farmer on opening his door early one morning, saw a splendid specimen of the kind blinking and looking very wicked, and fastened to a large, white gander that it had killed. In its efforts to fly off with its prey, it had dug its claws deeper and deeper into the flesh, till it was unable to disentangle them; and, as the gander was too heavy for it to lift, the spoiler became a captive.

A cry less frequently heard, and heard only in the Winter was the dull, heavy "*Bump-bump*" of the Snowy Owl. This bird comes south in the cold weather, but breeds in Arctic regions.

Another sound that I often paused on my way to listen to, was in those days accounted a mystery. Its cause was not known. I will read to you what Gosse, the Canadian Naturalist, said of it:—

"Listen to the singular sound proceeding from yonder cedar swamp. It is like the measured tinkle of a cow-bell, or regular strokes upon a piece of iron quickly repeated. Now it has ceased.

"There it is again. I will give you all the information I can get about it; and that is very little. In Spring, that is, during the months of April, May, and the former part of June, we frequently hear, after nightfall, the sound you have just heard; from its regularity it is usually thought to resemble the whetting of a saw, and hence the bird from which it proceeds is called the Saw-whetter. I say 'the bird,' because though I could never find anyone who had seen it, I have little doubt that it is a bird. I have asked Mr. Titian Peale, the venerable Professor Nuttal, and other ornithologists of Philadelphia about it, but can obtain no information upon the subject of the author of the sound; it seems to be

'Vox et præterea nihil.'

"Carver, in his amusing travels, mentions it as being heard near Lake Superior, naming it, if I recollect rightly, the Whet-saw. It may possibly be known, but I find nothing of it in Wilson or Bonaparte. Professor Nuttall was acquainted with the note, but told me plainly the bird was unknown. I conjecture it may be some of the herons or bitterns, or, possibly, from a passage in Bonaparte's Ornithology, the Evening Grosbeak (*Fringilla vespertina*). He says of that bird, 'their note is strange and peculiar: and it is only at twilight that they are heard crying in a singular strain. This mournful sound, uttered at such an unusual hour, strikes the traveller's ear, but the bird itself is seldom seen.'"

The sound is really produced by one of the smallest of the Owl family (*Cryptoglaux acadica*). Who it was that first made known the fact I do not know, but it is well established now.

I once saw a pair of these comical owls perched on the roadside fence, where a small brook crossed the way. I was in my waggon; and the confident yet inquisitive looks they gave me were very amusing. Probably, if I had attempted to leave the waggon, they would have flown quickly enough. I inferred that they had come to the brook in search of frogs.

Night-jars were plentiful in that part of the country in the summer. After night-fall they could be dimly seen overhead, hawking for moths and beetles. Their rapid movements, as they chased their prey, were not unlike those of the Tumbler Pigeon. And as they flew they uttered their plaintive call.

Once in a long while the scream of the lynx was heard in the night in that locality, as it was in the day time also. A little son of my next neighbor was passing through the woods one day when he was terrified by the cry of this animal. He started to run; and the lynx bounded along—all four feet in the air at once, after the manner of its progression—keeping a short distance on one side, and uttering repeatedly its startling cry, probably to call its mate. Whether the pair would have attacked the child I cannot say. Happily the sound of a woodman's axe was heard, and this guided the little fellow to safety and frightened the beast away.

In the early Spring the Frog Concert came off with great *eclat*, and was continued night after night. In it were heard the piccolo notes of the tree frog, the trombone of the bull frog, the cackling, croaking, rattling tattoo of the common frog, and now and then, like the jingle of the triangle, the "tr-r-r-r-ill" of a toad.

There are other sounds that break the stillness of the night—sounds produced by living creatures, but which can only by a figure of speech be termed the "voices" of the existences from which they come. To use the words of Ben Jonson:

> "The scaly beetles, with their habergeons,
> Do make a humming murmur as they fly."

Lachnosterna fusca, Fröhl, is the beetle that comes from the large white grub that is dug up so often in our gardens. Its shards, or elytra, are held erect while the true wings which are membraneous really bear the insect up, and by their vibrations produce the humming sound.

The impertinent "twang" of the mosquito is produced in like manner; and it is wonderful that wings so delicate and frail in appearance as those of the mosquito can be exercised with such rapidity as to produce so shrill a sound.

The antennæ of insects are supposed to serve instead of ears; and it may be that long and delicate antennæ with which many of the smaller kinds of Neuroptera are supplied were intended to catch the pulsations in the air caused by the rapid vibratory action of the minute wings of their compeers. Sounds we cannot hear are in all probability made known to the tiny companions of the creatures that produce them.

The wayfarer in the dusk of evening, who will pause near a patch of the Silk-Weed (*Asclepias cornuti*) in full blossom, will probably hear a distinct and continuous humming caused by the motion of the wings of the Sphinges and other moths, that flit from plant to plant, or hover over the blooms, and through their long and slender trunks, imbibe the nectar that Flora in her bounty has provided for them.

As the Summer advances, on nights when the weather is calm, the whole atmosphere seems to palpitate with the multitudinous calls, shrillings, chirrupings and sibillations of various orthopterous insects. The Naturalist with a good ear who will take Scudder for his guide,* and endeavor to distinguish between the notes of the different serenaders will have set himself an interesting task.

Day and night the Naturalist finds entertainment and food for reflection. It must be said though that the pursuit of Natural History is not always free from danger.

It is the custom, you know, for Entomologists to spread a mixture of molasses and rum upon the bolls of trees at nightfall, to attract Noctuids and then, at intervals, to visit the baits, carrying a dark lantern and the useful cyanide bottle.

A party of Montreal gentlemen were engaged in this "sugaring"—as it is called, in the outskirts of their city, when the sound of a pistol-shot broke the silence, and the *ping* of a bullet sounded unpleasantly near them. I need hardly say that their sugaring operations were abandoned for that night.

And this story reminds me of an experience of my own, in the long ago, when I was young and enthusiastic.

There was a wood about three miles from the town where I was living, and about the same distance from any other place—it was a lonely wood, I was accustomed to resort to it for Entomological researches. It was a grand hunting-ground; and I knew every part of it thoroughly. I was never disturbed nor molested there by anyone. I became very bold; and one night I determined to go there for sugaring purposes. I took a jar of prepared sweets, a dark lantern, and a supply of chip boxes; and I reached the wood about eleven o'clock. I had fairly entered and was preparing for work, when *bang! bang! bang!* broke upon my ear. I was startled you may well believe; but I understood the position in a moment; there were poachers in the wood shooting the pheasants at roost in the trees; and the men were but a few rods away. I said to myself, "If these men come upon me they will take me for a game-keeper; and if the game-keepers, hearing the guns, should hasten to the wood and find me here, they will take me for a poacher. In either case I shall fare badly." So I thought discretion the better part of valor, and made for my home as quickly and as quietly as I could.

It may be asked, of what interest to *Entomologists* are the Loon, the Fox, and the other creatures you have spoken of? To come to an answer you must follow a concatenation, such as that which connected the "priest all shaven and shorn" with "the malt that lay in the house that Jack built" and say:—

This is the Loon
That swallowed the Frog
That fed on the Gnats
That troubled the Folk
That lived in the house that Jack built

This is the Fox
That killed the Hen
That ate the Grigs
That leapt in the grass
That grew round the house that Jack built.

I remember a conversation that I had with the late Sir William Dawson. We were speaking of the Entomological Society of Ontario. He said. "I see that you have Geological, Ornithological, and Botanical Sections of your Society. We have regarded the studies that these pursue as of more importance than that which you make your chief consideration. The whole is greater than its part. But your proceedings show how one branch of Science intertwines with others."

* (See "Songs of our Grasshoppers and Crickets," by Samuel H. Scudder, Twenty-third Report Ent. Soc. of Ontario, 1892, page 62).

I trust then that my reference to animals, birds and reptiles will not have been deemed inappropriate on this occasion.

Dr. Fletcher, in expressing the thanks of the audience for the interesting addresses that had been given them, drew attention to the wonderful success which had attended Mr. Kirkland's efforts. He had himself spent some time in Massachusetts during the early part of the summer and had seen what was being done. Mr. Kirkland was one of those all-round men who realized that each branch of knowledge had a close relationship with every other branch. He was not only a good entomologist, but also a good chemist, and he brought his chemical knowledge into practical use to aid his entomology. As a result he showed all North America the great value of arsenate of lead as an insecticide. Mr. Kirkland's task was the most extensive experiment in economic entomology that had ever been undertaken in the United States or in any other part of the world, but he is a man of great executive ability and is able to organize and control his great staff of 1,700 men and to use to the best advantage the large sums of money provided by the State Legislatures and Municipalities for the suppression of the Gypsy and Brown-tail Moths. We in Canada are deeply interested in the work inasmuch as the latter of these pests has invaded Nova Scotia and is producing consternation and dismay among many fruit-growers there.

SECOND DAY'S SESSION.

The President, Dr. Fletcher, took the chair at 10 o'clock in the Biological lecture room of the Ontario Agricultural College, Guelph. There were present during the day a large number of students in addition to the members of the Society. The first order of the day was the reading of the reports of the Council, the branches of the society at Montreal, Quebec, and Toronto, and of the Treasurer, Librarian, Curator and the Delegate to the Royal Society of Canada. This was followed by the election of officers for the ensuing year 1907-8, which resulted as shown on page 6. Dr. Fletcher was re-elected president, as were also the other officers with the exception of the delegate to the Royal Society, for which position Mr. Arthur Gibson, of Ottawa, was chosen in succession to Mr. A. F. Winn, of Montreal.

REPORT OF THE COUNCIL.

The Council of the Entomological Society of Ontario begs to present its report for 1906-7.

The forty-third annual meeting of the Society was held at its new home in the Ontario Agricultural College, Guelph, on the 10th and 11th of October, 1906, and was attended by many members from a distance and also by a large number of students of the College and Macdonald Institute.

The first afternoon was devoted to a conference on the Codling-worm, during which its whole life history was discussed, the value of parasites as a means of control was considered and many practical points were brought out by the various speakers who took part in it. This was followed by the

Reports on Insects of the year presented by the directors from their respective divisions of Ontario.

In the evening a public meeting was held in the Massey Hall which was nearly filled with an appreciative audience in spite of the inclemency of the weather caused by the first snowstorm of the season. After a hearty welcome from President Creelman, the President, Mr. John D. Evans, read his address, and was followed by a paper on "What the Entomological Society of Ontario can do for the Ontario Agricultural College," by Professor Lochhead, and a description of "A Canoe trip for Entomological Purposes through the Algonquin Park"—illustrated by a number of original lantern views—by Mr. Paul Hahn, of Toronto. The second day was occupied with the reading of reports from the branches and officers of the Society and a series of scientific and practical papers, all of which have been published in the annual volume.

This volume, the 37th Annual Report to the Legislature of Ontario, was published in May last and contained 120 pages, a portrait of the retiring President, Mr. John D. Evans, and six beautiful half-tone plates of Galls from a variety of trees. Besides the papers already referred to it included the following articles: "A Hunt for a Borer," by Mr. H. H. Lyman; "Two Insects affecting Red Clover and Seed Production," "Insect Galls of Ontario," "The Locust Mite," and "The Oyster-shell Bark Louse," by Mr. T. D. Jarvis; "Hemiptera," "In the tracks of *Nematus Erichsonii*" and "The Notodontidæ of the Province of Quebec," by Dr. Fyles; "Basswood, or Linden, Insects" and "The Bean Weevil," by Mr. A. Gibson; "Insects injurious to Ontario Crops in 1906" and "The Entomological Record, 1906," by Dr. Fletcher; "Injurious Insects of 1906 in Ontario," by Prof. Bethune.

A summer meeting of the Society—the first for a great many years—was held at the Ontario Agricultural College on the 4th and 5th of July. Through the kindness of President Creelman, the members from a distance were hospitably entertained in the College residence during their visit, and the ladies of the party were provided for in the Macdonald Hall. There were present also a number of Ontario teachers who were taking a summer course of Nature Study at the Macdonald Institute, and several students and members of the College staff. The first afternoon, the President, Dr. Fletcher, occupying the chair, papers were read by Mr. Lyman on the distinction between *Thecla calanus* and *Edwardsii;* Dr. Brodie on the life-history of a colony of Tent Caterpillars and the parasites infesting them; Dr. Fletcher on the control of the Gypsy and Brown-tail moths in Massachusetts by the importation of parasites from Europe, and Mr. C. W. Nash on "Balance in Nature." In the evening Dr. Henry Skinner, of Philadelphia, gave an interesting lecture on "Insects as Carriers of Disease;" Mr. Nash spoke upon "Instinct *vs.* Education," and Dr. Fletcher gave an instructive address on "Nature Study as a means of Education." The second day was devoted to an excursion to Puslinch Lake, about sixty taking part in it; after some hours spent in collecting entomological and botanical specimens, short addresses were given by the College staff and others upon the various objects of interest that had been brought in.

At a subsequent meeting of the Council, Mr. L. Caesar, O. A. College, was elected secretary for the remainder of the year in place of Mr. E. J. Zavitz, who resigned on account of the pressure of his duties in the Department of Forestry, which left him no time to devote to the business of the Society.

The Canadian Entomologist, the monthly magazine of the Society, has been regularly issued at the beginning of each month. The 38th annual volume was completed in December last, and ten numbers of the 39th volume

have now been published. The volume for 1906 contains 425 pages and is illustrated with four full-page plates and 48 figures from original drawings. The contributors numbered 66 and included writers in Canada, the United States, Hawaiian Islands, England and Jamaica.

From October to the middle of May meetings of the Society were held in the Biological lecture-room on alternate Wednesday evenings, and occasionally more frequently. The members of the Wellington Field Naturalists' Club joined with those of the Society in the proceedings and thus a variety of biological subjects were discussed in addition to those of an entomological character. The attendance was very satisfactory, many Nature Study students and members of the third and fourth years being present at most of the meetings.

The reports from the branches of the Society at Montreal, Quebec, Toronto and British Columbia are very satisfactory, meetings having been regularly held and many papers read and discussed. The last named branch has published a quarterly Bulletin containing lists of British Columbia insects of various orders and many highly interesting notes and observations.

The newly organized Entomological Society of America held its first meeting in New York at the end of December last. It is gratifying to record that our Society was recognized by the election of Dr. Fletcher as first Vice-President, and Dr. Bethune as a member of the Executive Committee; both these gentlemen are also original Fellows of the new Society. In August the Society held its second meeting at Boston during the sessions of the Seventh International Congress of Zoologists; Dr. William Saunders, of Ottawa, and Mr. H. H. Lyman, of Montreal, two of our members of long standing, were elected Fellows, and Dr. Bethune, one of the two representatives of the Society on the Council of the American Association for the Advancement of Science.

JAMES FLETCHER, President.

ANNUAL REPORT OF THE MONTREAL BRANCH.

The 284th regular, and 34th annual meeting of the Montreal Branch was held on May 11th, at the residence of Mr. Geo. A. Moore, 209 Prince Arthur Street.

The following were present:—Mr. G. A. Moore in the chair; Messrs. H. H. Lyman, G. Chagnon, E. C. Barwick, E. Denny, A. E. Norris, E. Kollmar, G. R. Southee, C. W. Sach, A. F. Winn.

The Secretary read the following report of the Council:

During the year, meetings have been held monthly, excepting in July, August and September, the attendance averaging seven members. Four new members have been added to our roll, Messrs. M. W. Davis, C. S. Fosbery, E. Kollmar, C. W. Sach.

A field day was held on May 24th at St. Hilaire, and several members attended the outing of the Natural History Society at St. Gabriel de Brandon.

The papers read at the meeting were:

"Reflections and Suggestions," Henry H. Lyman.

"St. Hilaire, May 24, 1906," G. A. Moore.

"Notes on Coleoptera collected by Mr. Moore at Como, Que.," G. Chagnon.

"Collecting Catocalae in the day-time," E. Denny.

"Collecting Hemiptera at Como," G. A. Moore.

"The Genus Chrysbothris, with notes on Canadian Species," G. Chagnon.

"Clastoptera," G. A. Moore.

"Thecla calanus and T. Edwardsii," Henry H. Lyman.

Specimens of the following genera of moths were brought together at the various meetings for comparison and study:—Xylina, Acronycta, Datana, Hadena, Feltia and Heliophila, resulting in a better knowlege of these groups, and the correction of several errors in identification.

Your Council would again urge the members to write short notes for the meetings, and also to prepare for the fall meetings, reviews of the summer's work in the field, experiences in breeding species, studies of habits, etc.

Additions to our collection of specimens, books and photographs should not be forgotten.

St. Madeleine, Que., has been suggested as a locality suited for the field day on May 24th.

Respectfully submitted,

(Signed) GEO. A. MOORE,
President.

The treasurer's report showed a balance on hand of $59.40. The reports of the curator and librarian were also submitted and adopted.

The following officers were elected:—President, Geo. A. Moore; Vice-President, E. C. Barwick; Sec.-Treasurer, A. F. Winn; Librarian and Curator, L. Gibb; Council, G. Chagnon, H. H. Lyman, G. R. Southee, E. Denny.

REPORT OF THE QUEBEC BRANCH OF THE ENTOMOLOGICAL SOCIETY OF ONTARIO.

The Quebec Branch of the Entomological Society of Ontario has pursued its useful course for a period of ten years.

We have had to mourn the demise of some of our members and to bid adieu to others who have moved to distant localities, but additions to our membership have from time to time encouraged us.

The authorities of Morrin College still allow the Branch to hold its meetings in that institution—a privilege that is highly appreciated by the members.

The past season has been, for the most part, an unfavorable one for entomologists, on account of the frequent rains, but much good work in collecting was done by our curator, Mr. A. R. M. Boulton. Such fine moths as *Ceratomia amyntor*, Geyer, *C. undulosa*, Walker, *Sthenopis argenteo-maculatus*, Harris, being taken by him.

Mr. Boulton also, on one of his excursions, discovered a batch of Hemaris larvæ, feeding upon a solitary bush of *Viburnum opulus*, Montmorency. The larvæ are true Sphinges in form and attitude; but they lack the transverse side-lines that other Sphinges have, and they do not bury themselves in the ground when full fed, but spin a slight cocoon among leaves above ground.

Another interesting batch of larvæ was brought from Miranda, P. Q., by Miss Johnson, one of our members. It was one of *Anisota Senatoria*, S. & A., a species that has not hitherto been taken at Quebec.

A case of valuable specimens from California was presented by Miss Freeman.

The Branch now numbers 28 members.

During the year papers were read by the President on *Hemiptera*, on the *Flora* and *Fauna* of the Province of Quebec, on "Voices of the Night," on

Insects injurious to Gardens and Fields, on the Asparagus Beetle (*Crioceris asparagi*) and on the Habits of Insects.

The members were hospitably entertained at the houses of the President and Mr. J. H. Simmons, and also by Mr. and Mrs. Geggie, at "Darnoc," Beauport, where a very enjoyable field-day was held.

At the annual meeting held on the 9th October, 1907, the officers for the coming year were elected as follows:—President, Rev. Dr. Fyles; Vice-President, Mrs. Richard Turner; Secretary-Treasurer, Lt.-Col. Crawford Lindsay; Council, Hon. Richard Turner, J. H. Simmons, Esq., Miss Bickell, Miss Freeman, Miss Hedge.

CRAWFORD LINDSAY,
Sec.-Treasurer.

REPORT OF THE TORONTO BRANCH, 1906-7.

The eleventh annual meeting of the Toronto Branch of the Entomological Society of Ontario was held in the Provincial Museum on Tuesday, June 18, 1907.

The President, Dr. Brodie, was in the chair and the following members were present:

Dr. Brodie, Mr. Williams, Mr. Webb, Miss Blackmore, and several visitors.

The Secretary read the following report:

We have pleasure in announcing a very successful and profitable year's work. Our membership roll is slightly increased, although one or two have dropped out.

In all we have had eight meetings and the average attendance of members has been nine. At all the meetings we have also had a number of visitors.

The papers read during the session have been instructive and entertaining, and some have presented material entirely new; at least to most of the members. Not a few have been illustrated by specimens, charts, and models, which added greatly to the value of the lectures.

LIST OF PAPERS, 1906-7.

1. Snout Beetles, Mr. Cosens.
2. Contributions of the 19th Century to the World's Knowledge, Dr. Brodie.
3. Nuptial Dance of some Insects, Dr. Brodie.
4. A week at Niagara, Mr. Williams.
5. An Early Writer on Entomology, Mr. Cosens.
6. Ancestors of Insects, Dr. Walker.
7. Insect Mimicry, Dr. Brodie.

Publications have been received from Ottawa and Washington, from the Ohio and Connecticut Experiment Stations, and from New York State Museum at Albany; and a donation of some Toronto beetles from Mr. Arthur Reston.

The Treasurer reported a balance in hand of $5.55.

The following officers were elected: President, Dr. Brodie; Vice-President, Dr. Walker; Secretary-Treasurer, Miss Blackmore; Librarian and Curator, Mr. Williams; Council, Mr. Hahn, Mr. Webb, Dr. Abbott, Mr. Ivy.

An excursion was made to Niagara Glen on June 8th. About 15 people went, and some very interesting collections were made, especially of shells.

E. BLACKMORE,
Secretary.

TREASURER'S REPORT.

FOR THE YEAR ENDING AUGUST 31ST, 1907.

Receipts.		*Expenditure.*	
Balance on hand Sept. 1, 1906.	$ 523 75	Officers' Salaries	$225 00
Members' fees	399 38	Annual Report	206 75
Legislative Grant	1,000 00	Printing Account	909 08
Sales of pins, cork, etc.	46 01	Expense account, postage, etc.	72 76
Sales of Can. Entomologist	203 81	Purchase of pins, cork, etc.	17 31
Advertising	16 00	Library	12 60
Bank Interest	6 66	Insurance of library and collections	26 00
Refund for rent in London	10 00	Expenses of annual meeting.	95 38
		Balance	640 73
	$2,205 61		$2,205 61

S. B. MCCREADY,
Treasurer.

Examined and found correct this 25th day of October, 1907.
(Signed) J. W. CROW *and* B. BARLOW, *Auditors.*

REPORT OF LIBRARIAN.

During the year ending August 31st, 1907, there have been added to the Library twenty-two bound volumes and a large number of periodicals, bulletins and pamphlets; a considerable portion of these will be bound up into permanent volumes during the next few months. Among the new books may be mentioned Folsom's Entomology, with reference to its Biological and Economic aspects; Sir George Hampson's Catalogue of the Noctuidæ in the British Museum, vol. vi.; and Barker's Anatomical Terminology.

48 volumes have been taken out by members during the year and the library has also been made use of for reference and consultation.

Respectfully submitted,
CHARLES J. S. BETHUNE,
Librarian.

CURATOR'S REPORT.

During the past year the Curator's work has consisted chiefly in the general care of the Society's collections, the inspecting of the cabinets for pests from time to time, and the placing in the cases of new specimens contributed by members of the Society. In addition to the general work the collections have been gone over and lists prepared of species particularly wanted to fill gaps and replace old and imperfect specimens in the Society's cabinets. These lists will be furnished to members of the Society and it is hoped that all members having spare specimens of the listed species will forward them to the Curator, with date and locality labels attached, in order that the Society's collection may be made as complete and perfect as possible.

Since the last report the following contributions have been made to the collections and our sincerest thanks are due to the generous contributors:

8 specimens of Lepidoptera by Dr. Fletcher, Ottawa; 2 specimens of Coleoptera by J. D. Evans, Trenton, Ont.; 2 specimens of Lepidoptera by C. H. Young, Ottawa; a large collection of Canadian and exotic Coleoptera by Henry S. Saunders, Toronto; 2 specimens of Lepidoptera by J. H. Cook, Albany, N.Y.; 2 specimens of Coleoptera by E. J. Zavitz, O.A.C., Guelph; over 200 species of Lepidoptera by F. H. Wolley Dod, Millarville, Alberta; 50 specimens of Lepidoptera by Charles R. Eby, Washington, and an extensive collection of Insect Galls by T. D. Jarvis, O.A.C., Guelph.

Since the Society's cabinets were installed in the Biological Building at the College, the collections have been constantly accessible to visitors and have been made great use of by the members of the Entomological Department to illustrate lectures and as an aid in the determination of the species submitted to the Department for identification. They have also been a great help to Third and Fourth Year students in naming specimens in the collections which they are requested to make as a part of their work in Entomology.

Respectfully submitted,
J. E. Howitt, *Curator.*

REPORT TO THE ROYAL SOCIETY OF CANADA.

The following is the report to the Royal Society of Canada from the Entomological Society of Ontario, through Mr. A. F. Winn, Delegate.

The most important event in our Society, during the past year, was the transferring of headquarters to Guelph from London, where they were established in 1872. This change was found necessary owing to the dying out of interest in Entomology in London, and Guelph was selected as being the place most suitable to secure the best interests of the Society, as well as being in accordance with the wishes of the Ontario Department of Agriculture. Aside from the fact that the Society already had a flourishing branch there with a large list of members, at the Agricultural College attendance at lectures in Entomology is compulsory for students in the second and third years, while in the fourth year some specialize in the subject and naturally become active members of the Society and thus ensure a continuity of work and interest.

The collections of books and specimens were moved without any damage whatever. The cabinets of specimens are now conveniently arranged for reference in a portion of the College Museum set aside solely for them. The books and pamphlets, which form a valuable collection of over 1,800 volumes are in a series of stacks in the fireproof Massey Hall Library Building, and are kept entirely distinct from the general library of the College.

Our magazine, "The Canadian Entomologist," has been issued regularly early every month. The 38th volume comprises 425 pages with four full page plates, and 48 figures in the text. The contributors number 66, spread not only through Canada but the whole of North America, and a few residing in England, the West Indies, and the Hawaiian Islands. Two new genera of insects are described and one hundred and fifty new species as well as a number of varieties.

Life histories of several species of insects are recorded, including among the Lepidoptera. *Barathra curialis* by Dr. Fletcher and Mr. A. Gibson; *Incisalia irus* and *I. augustus* by Mr. John H. Cook; Among the Hemiptera,

Mr. J. R. de la Torre Bueno gives the first full account of the Water-bugs *Belostoma fluminea* and *Ranatra quadridentata.*

The series of articles on Practical and Popular Entomology has been continued and the papers published last year are: The Dragon-flies and Damsel-flies by Prof. Franklin Sherman, Jr.; Household Insects by Prof. Wm. Lochhead; Winter Retreats of Insects by Rev. Dr. Fyles; Some Beetles of early May by Rev. Dr. Bethune; Work for June Caterpillar hunting by Mr. A. Gibson; Mites affecting Farm Homesteads by Mr. T. D. Jarvis; The Oyster-shell Bark-louse by Mr. T. D. Jarvis; The Bean Weevil by Mr. A. Gibson; The Locust Mite by Mr. T. D. Jarvis.

Articles descriptive of new species of Lepidoptera are by Mr. A. G. Weeks, Jr.; Mr. August Busck, Mr. A. Cosens, Rev. G. W. Taylor, Mr. John A. Grossbeck. Coleoptera by Mr. Chas. Schaeffer, and Mr. H. C. Fall. Hemiptera by Dr. E. Bergroth. Diptera by Miss C. S. Ludlow, Dr. M. Grabham, Hon. N. Chas. Rothschild. Hymenoptera by Mr. J. C. Crawford, Mr. Myron H. Swenk and Prof. T. D. A. Cockerell. Orthoptera by Mr. A. N. Caudell. Coccidæ by Mr. R. S. Woglum.

Papers on Classification include Mr. G. W. Kirkaldy's Catalogue of Aphidæ; The Classification of Culicidæ by Prof. S. W. Williston; The Perlidæ by Mr. Nathan Banks; Synopsis of Bees of Oregon, Washington and British Columbia, by Mr. H. L. Viereck and associates; Notes on the classification of the superfamily Miroidæ by Mr. G. W. Kirkaldy.

The following are among the papers on miscellaneous topics: A North American Entomologists' Union by Mr. H. H. Lyman; Records of Orthoptera from the Canadian North-west by Dr. E. M. Walker; The Burrows of Cicindela by Mr. W. T. Davis; A fossil Water-bug by Prof. T. D. A. Cockerell; The snow-fly, Chionea valga by Mr. C. N. Ainslie; Notes on Hemiptera taken near Lake Temagami by Mr. E. P. Van Duzee; Geometrid Notes by Mr. Richard F. Pearsall.

Space has been devoted to records of the meetings of the Branches at Toronto, Guelph, Montreal, Quebec and Vancouver which are all in flourishing condition. The appearance of the new books and pamphlets on Entomological subjects has been promptly chronicled.

The Society has, as usual, furnished the Ontario Department of Agriculture with an account of its annual meeting, and a number of articles of popular and economic nature. These have just been published under the well-known title of The Annual Report of the Entomological Society of Ontario. Report 37 contains 120 pages illustrated by 6 beautiful half-tone plates of insect galls found on plants of various kinds, 36 cuts in the text and a portrait of our last year's President, Mr. John D. Evans. Among the papers may be mentioned: Parasitism of Carpocapsa pomonella, (the Codling Moth), by Dr. Brodie; A Hunt for a Borer by Mr. H. H. Lyman; Insect Galls of Ontario, by Mr. T. D. Jarvis; Hemiptera, by Rev. Dr. Fyles; Injurious Insects of 1906 in Ontario, by Rev. Dr. Bethune; Basswood, or Linden, Insects, by Mr. A. Gibson; Insects Injurious to Ontario Crops in 1906, by Dr. James Fletcher.

Dr. Fletcher's Entomological Record for 1906 requires 19 pages, is full of notes on the occurrence and distribution of the rarer species of Canadian insects, and becomes each year more valuable.

In conclusion your Delegate drew attention to the fact that the much dreaded Brown-tail Moth had established itself in Nova Scotia and hoped that immediate and thorough action would be taken to rid the country of an insect, which, if allowed to breed without check would prove disastrous to the far famed apple orchards of the Annapolis Valley.

During the remainder of the morning and in the afternoon the following papers were read and briefly discussed: "Further notes on Hepialus Thule at Montreal" by Mr. H. H. Lyman, and "Notes on Collecting Sthenopis (Hepialus) Thule at Montreal" by Mr. E. Denny. (These two papers are published in the *Canadian Entomologist* for December 1907). "The Two-winged Flies of the Province of Quebec" by the Rev. Dr. Fyles; "The Scale Insects of Ontario," illustrated by a large number of specimens, by Mr. T. D. Jarvis; "An Unusual Outbreak of Halisidota Caterpillars" by Mr. Arthur Gibson; "A Remarkable Outbreak of the Variegated Cut-worm" by Prof. Bethune and Mr. L. Caesar; "Insects Injurious to Ontario Crops in 1907" by Dr. James Fletcher; "Insects of the Season, 1907" by Prof. Bethune; "The Entomological Record for 1907" by Dr. Fletcher. The session was brought to a close with the Presidential Address of Dr. Fletcher on "The Entomological Outlook in Canada." These papers will be found in subsequent pages of this report.

In the evening an illustrated lantern lecture was given in Massey Hall by Dr. E. M. Walker of Toronto, on collecting and rearing Dragon-flies, after which votes of thanks were accorded to President Creelman, the local officers of the Society and the lecturers. The meeting then adjourned.

COLLECTING AND REARING DRAGON-FLIES AT THE GEORGIAN BAY BIOLOGICAL STATION.

By E. M. Walker, M.D., Toronto.

During the summer of 1907, I spent two months at the Freshwater Biological Station, Georgian Bay, Ont., and there had good opportunities for studying the aquatic insect life, especially the Dragon-flies, which were particularly abundant both in species and individuals and to which a considerable amount of time was devoted.

In this work I was ably assisted by W. J. Fraser, who also continued the work for about three weeks after I left, and to whose keen observation and enthusiasm much of the credit of the work is due.

The Georgian Bay Biological Station, whose site is on one of the numerous islands about the entrance to Go Home Bay affords the entomologist almost ideal conditions for the study of aquatic insect life, combining as it does the advantages of a laboratory equipment with those of extremely varied natural surroundings in which a great many different kinds of aquatic environments are represented.

In addition to the laboratory building, the Station is provided with a dwelling house for the use of its working staff, a store-house for material, a tank and pumping engine to supply the laboratory with running water and a boathouse supplied with several small boats, fishing-nets and other collecting apparatus. The laboratory building is situated close to the water's edge and has an ample floor space of 20 x 40 ft., divided into a large general laboratory and 4 small rooms, used respectively as photographic, chemical, glassware and private rooms. The laboratory affords working space for 12 students and in its centre is a long aquarium table supplied with running water from the tank so that it is possible to keep under observation animals, such as fish-embryos or the inhabitants of rapid streams which soon die or at least do not thrive in an ordinary aquarium.

In view of its connection with the Department of Marine and Fisheries the work of the Station is primarily concerned with problems relating to pisciculture, such as the spawning habits of the various food fishes and the

natural history of the smaller forms of life upon which they feed. In this connection a knowledge of the life histories of the aquatic insects is of considerable importance, forming as they do a large part of the food of some of the fish. The food of the brook-trout for example as Prof. Needham has shown (Aquatic Insects in New York State, Bulletin 68, N.Y. State Museum) consists almost entirely of certain aquatic insect larvæ, particularly those of a certain Chironomid fly, while other small dipterous larvæ, caddis worms, etc., contribute a considerable proportion.

At Go Home Bay we frequently found the stomachs of the common sucker filled almost exclusively with the full-grown nymphs of the large May-fly (*Hexagenia bilineata*) which breeds in enormous numbers in the bays and channels in that locality, and many other instances could be given of insects forming an important part of the food of fish.

A considerable portion of the two months which I spent at the Station was accordingly devoted to this branch of the work, most attention having been given to the Dragon-flies, as the group with which I was most familiar and one which was very abundantly represented there.

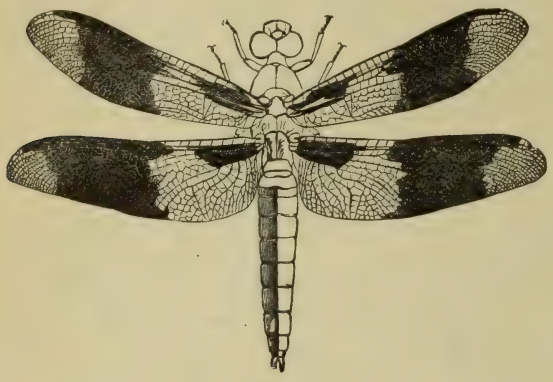

Fig. 4. Dragon-fly.

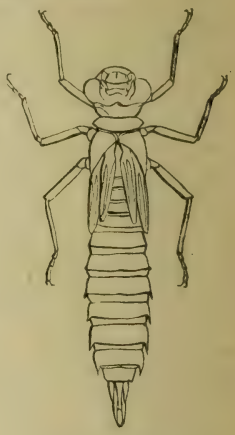

Fig. 5. Nymph.

Fig. 6. Larva seizing its prey and the Dragon-fly emerging from the Nymph.

Fig. 7. Damsel-fly.

Fig. 8. Nannothemis bella.

Life-History of Dragon-flies.

All Dragon-flies (Fig. 4.) are aquatic in their early stages and all inhabit fresh or occasionally brackish water. The eggs are deposited by the female upon various aquatic plants or freely upon the surface of the water, either singly or in clusters of varying size, sometimes enveloped in a gelatinous mass like those of snails or frogs. On hatching the young nymphs at once begin the active predaceous life which is characteristic of the whole tribe. They feed upon all kinds of small aquatic life, such as other aquatic insects, snails, tadpoles, or even small fish, which they grasp by means of a pair of hooks at the end of the enormously developed labium. This structure when at rest is folded under the head, concealing the mouth-parts like a mask, but when a small insect or other suitable animal chances to pass near by, it is suddenly thrust out with lightning speed and the victim drawn back within reach of the powerful mandibles (Fig. 6.). The length of the nymph's life varies greatly in different species, sometimes 3 or 4 years being required to reach maturity. When ready for transformation the nymph crawls out upon some suitable support such as a rock, reed or log, the choice of this support and its distance from the water's edge varying in different species (Fig. 6). In a few minutes the thorax begins to bulge, the skin splits along the median line and across the head, and the insect gradually emerges, the thorax appearing first, then the head, wings, legs and finally the abdomen; the latter is at first comparatively short and stout but rapidly elongates and at the same time the wings expand. The coloration is at first very pale and indefinite and it generally requires at least a day before it is fully mature.

Transformation usually takes place early in the morning and hence this is an excellent time for collecting material, for one can often get the imagoes of good species, together with the exuviæ of their nymphs, which retain the form of the latter perfectly and are therefore invaluable as specimens. The imagoes with their exuviæ are best collected in paper bags, in which they can be kept until the colors have matured.

Nymphs (Fig. 5.) of different species inhabit different aquatic environments and all such should be thoroughly searched. The best apparatus for general collecting is the sieve-net devised by Prof. Needham (Bull. 39, U.S.N.M.). This is a deep galvanized iron tray with a bottom of galvanized wire-screen. It can be made like a rake as a combination of net and sieve.

Most nymphs are easily reared in ordinary aquaria though some require running water. We used large, glass jars, covering the top when necessary with cheese cloth. A quantity of the rubbish in which the nymphs naturally live should be placed in the water and a few branches or boards for them to crawl out upon at the time of transformation. A sufficient quantity of aquatic plants must be used to keep the water fresh and the rubbish containing the nymph's food changed once a week.

As already observed the natural conditions which obtain in the vicinity of Go Home Bay are very well adapted to the study of aquatic insect life. Lying at the mouth of the Go Home River, one of the outlets of the Muskoka Lake system, it is within easy reach of a variety of different kinds of aquatic environment, representing all the transitions from the open lake to the sheltered river system. There are the rocky islands and reefs in the open lake, wind-swept and wave-tossed and either wholly barren of vegetation or affording but a scanty sustenance to a few stunted pines, junipers and other hardy plants in the crevices of the rocks, while further inland there are the deep quiet waters of the bay with numerous wooded islands,

and finally the moving water of the Go Home River. Then at many points along the irregular shores of the mainland and the larger islands, shallow inlets with sandy or gravelly bottoms and a luxuriant aquatic and shore vegetation support a widely different fauna from that of the more exposed parts, while finally there are numerous small inland lakes, which again present conditions quite distinct from any of those already mentioned. Their shores are sometimes rocky and bare in places but are for the most part swampy; floating sphagnum bogs being a special characteristic of the margins of these lakes. These are often gems of natural beauty and are of great interest to both zoologists and botanists on account of the many rare and interesting forms, mostly of a boreal character, which are met with here.

The first collecting trip after my arrival at the Station was made on June 16th to one of the larger of these enclosed lakes. The black flies were so tormenting that collecting, especially in a sheltered spot like this, was by no means a pleasure and even in the more exposed islands their numbers were sufficient to cause us considerable annoyance. But few dragon-flies were as yet abroad and these had for the most part not yet attained their mature coloration. *Libellula exusta*, Say., was the most abundant and continued to be so throughout a large part of the season. It is not common with us at Toronto but here, particularly during July, was extraordinarily numerous everywhere in the woods, but especially about these lakes and in the shallow swampy inlets. The female is inconspicuously colored but the males have their bodies covered in part by a bluish-white bloom which renders them very conspicuous when chasing each other over the water or resting on the rocks and logs. We found the nymphs of next year's brood in large numbers in the red-rotten vegetation at the bottoms of these lakes and the exuviae where commonly found adhering to the sedge and grass near the water's edge.

Another Dragon-fly of very different structure and appearance but frequenting the same sort of waters, is *Gomphus spicatus*, Selys. This was also met with on our first trip in considerable numbers and continued to emerge for some days afterwards. It belongs to a group whose nymphs are burrowers and in accordance with such habits are more or less flat with legs adapted for digging. They live in the silt at the bottom of lakes, ponds and streams, the tip of the elongated abdomen being held above the surface for breathing purposes. The imagoes, like most species of the genus, are dark brown with yellow bands and spots, rather small, widely separated eyes and a more or less club-shaped abdomen in the male. They also have the characteristic Gomphine flight, which though swift is generally very short, the insect constantly alighting, usually upon flat ground, seldom perching upon twigs after the manner of Libellulines. *G. spicatus* became very abundant at Go Home but like most of its congeners it is comparatively short-lived and by the middle of July has almost disappeared.

A third species of which only freshly emerged examples were taken on this date was *Leucorhinia frigida*, Hag., a small Libelluline of distinctly northern distribution which is quite absent from the fauna of southern Ontario. It became one of the most abundant Dragon-flies at Go Home Bay and was especially characteristic of the small lakes, while our common southern species *L. intacta*, Hag., was but rarely met with. Its nymphs had never been found before, but we obtained them in large numbers and reared them without difficulty.

Four other species were also taken on this date, two common little Damsel-flies or Agrionidae, the little blue *Enallagma Hageni* (Walsh)

and the wide-spread *Ischnura verticalis* (Say), that familiar little green and black species with the blue-tipped abdomen; and two species of *Tetragoneuria*, the common *semiaquea* (Burm.), and the larger and more northern *spinigera* (Selys.). The former is common everywhere in southern Ontario, but I have never seen them in anything like such large numbers as they appeared at Go Home Bay, especially about the last week in June, when on hot still days they positively swarmed in favorable spots. They breed most abundantly in the little marshy coves along the shore, and here the exuviae were sometimes so numerous that a single reed or grass stem would bear half a dozen of them.

Next day we went to the 'Chute,' a waterfall a short distance up the river. Here two other dragon-flies not often taken by the ordinary collector were found. These were *Didymops transversa* (Say), and *Basiaeschna janata* (Say.). The former is a brown insect with clear wings, the abdomen transversely banded with pale yellow and distinctly club-shaped in the male, while the latter is closely related to the various members of the genus Aeschna, those large dragon-flies with blue-spotted bodies that are so common in late summer. Both of these forms have the habit of following the shores of the lakes and streams in a regular beat so that if one stations one's self at some point along their course, one has a fair chance of capturing them as they pass by sweeping the net at them from behind.

The nymph *transversa* is a very curious spider-like creature with a round abdomen and long sprawling legs which clambers about the rocks along the shores of the bay and when ready to transform usually crawls several yards at least from the water's edge. The only other Canadian species allied to it also appeared at Go Home, but later in the season, namely about July 4, when *Didymops* had already disappeared. The nymph of this species (*Macromia Illinoiensis*, Walsh) closely resembles that of *Didymops* but the imago is a much larger and finer insect, a splendid dragon-fly, black with a conspicuous yellow spot on the upper side of the abdomen and the sides of the thorax metallic green with an oblique yellow stripe. It has also superb aerial powers and great patience and determination is required to get many specimens.

Towards the end of June new dragon-flies were constantly making their appearance. On the Station Island, which lies partly well out toward the open bay, three species of Gomphus appeared about this time, *G. sordidus*, Selys., a large species, much resembling *spicatus* but quite different in habitat, appeared in great numbers, the nymphs crawling out from among the boulders along the shore and transforming upon the rocks close to the water's edge. In a few days the islands were covered with them but they were very short-lived, the great majority having disappeared by the first week in July. A few specimens also of *G. brevis* (Selys.), a short thick-set form, appeared about the same time but were found to be more characteristic of the rapids of the river, while a few days after the first *sordidus* emerged, *G. exilis* (Selys.), appeared, soon increasing greatly in number and showing a much wider choice of habitat than either of the others. While *spicatus* and *sordidus* were only accidentally found together, *exilis* was commonly associated with both of them. The food of these Gomphines seems to consist chiefly of May-flies, which are so abundant during their season of flight and which likewise disappear so suddenly.

More interesting than any of these, however, was the discovery of *Neurocordulia yamaskanensis* (Prov.), a species originally described from Mount Yamaska, Quebec, by L'Abbe Provancher, but which has been taken by very few collectors since then. Several years ago I obtained a number of nymphs and exuviae, of a kind unfamiliar to me, in Algonquin

Park, which were referred by supposition to this insect, as they clearly belonged to the same genus as *N. obsoleta* (Say.), the only other regional species and whose nymph was already known. This summer I had the good fortune to come upon the same kind of exuviae upon the timbers of the wharf at Go Home, where they had evidently emerged from water of considerable depth, 5 or 6 feet at least. Further search revealed others on the steeper parts of the rocky shores and on June 28th a special hunt for the emerging imagoes was made in the early morning. After protracted search, when we had almost come to the conclusion that their time for transformation was over, one was at last found in a wide crevice accompanied by its exuviae, and on subsequent occasions several more were obtained.

No imagoes could be found on the wing, however, and it became a subject of conjecture to us what became of them. One evening, however, some time after sunset, Mr. Fraser made the discovery that they were flying about the island in pursuit of May flies. Since then we took them repeatedly at almost the same hour, but at no time during the day were they ever seen upon the wing, except when started from a bush or tree where they were resting. This is the only case I know of a strictly crepuscular dragon-fly though several diurnal species, such as the Aeschnas, are known to fly until dusk.

Several other forms belonging to this same group of Cordulinae were met with but the only ones which occurred in large numbers besides the *Tetragoneurias* already alluded to, were the dainty and beautiful little *Dorocordulia libera*, (Selys.) and the large and striking *Epicordulia princeps*, (Hag.). The former with its delicate form and slender waist, its vivid emerald green eyes and dark metallic green body is one of our most exquisite dragon-flies. Its nymph is an inhabitant of the swampy inlets and boggy margins of the enclosed lakes, and here the imagoes may be found coursing up and down over the water or the bog, with the abdomen tilted up in a peculiar way, or sunning themselves upon the leaves along the shore.

Epicordulia princeps, (Hag.) is a species of more southern distribution and hence more often seen in collections. It is peculiar among Cordulines in having the wings spotted after the manner of some of the common Libellulae, but is readily distinguished from these on the wing for it is a much more restless insect, flying ceaselessly over the larger bodies of water often at considerable heights, but also common enough in the rocky open woods some distance from the shore. It was a very characteristic species about Go Home Bay from the last week in June until about the middle of August.

The largest and most striking of all the dragon-flies of the region, however, has not yet been mentioned. This is a great black and greenish-yellow Gomphine, *Hagenius brevistylus*, (Selys.) which suddenly appeared on the Station island and elsewhere in considerable numbers. Its great size, striking coloration and the peculiar way in which the abdomen is curved downward in flight renders it a formidable-looking insect on the wing, while its nymph is a most gorgeous creature very different in appearance from other Gomphines. It is a large flat brown insect with a nearly circular abdomen looking more like a gigantic bed-bug than anything else. They live among the roots and debris along the lower and more sheltered parts of the shore, always, however, where there is considerable wave-action or current. The few nymphs we found before their time for transformation began died in confinement, the water in which they were kept not having been sufficiently well aërated.

Numerous other dragon-flies were taken and the nature of their breeding places more or less definitely determined, but time does not permit me to mention more than a few of these.

The greatest rarity was *Nasiaeschna pentacantha* (Ram.) of which probably less than twenty specimens exist in collections, although it is distributed as far south as Texas and has been known a long time. Last year Mr. Fraser obtained three specimens of its peculiar nymph near Bala, Muskoka. This is a large sluggish dark-brown creature of apparently similar habits to those of *Hagenius* but entirely different in appearance. This summer I accidently found a nymph clinging to my paddle while passing through a short channel which leads into one of the small lakes. Further search for nymphs proved fruitless but a few days afterwards a few imagoes were seen on the wing over a marsh on the border of the same lake, but were too wary to be netted. About a week later, however, I chanced upon a similar spot in another locality and managed to net a fine male, and this was the only one taken as the season was apparently about over.

Another somewhat rare species and a very odd and interesting little one is *Nannothemis bella* (Uhl.) Fig. 8. This is a very tiny dragon-fly, though it belongs to the Libellulidae which are mostly large forms, whereas all the rest of our very small species belong to the Agrionidae or Damsel-flies. The male, which is at first perfectly black, very soon becomes covered with a bluish dust, while the female is black with transverse bands of yellow. It was only found in two places but at one of these it was exceedingly abundant. This was a small floating sphagnum bog occupying one corner of an enclosed lake and having an area of scarcely 50 square yards. Here they were flying about among the grass and bog plants close to the ground and when perching had the peculiar habit of folding the wings downwards on each side of the stalk which formed their support. This spot was a veritable little garden of orchids and other interesting plants. Over the sphagnum moss the cranberry vines trailed in the greatest profusion, while pitcher-plants, sundews of two kinds, the delicate rose-colored orchids, *Pogonia ophioglossoides* and *Limodorum tuberosum*, and the tufts of white cotton-grass were a most charming spectacle. It is among the roots of the cranberry-vines and sphagnum that the nymphs of *Nannothemis* live, these being well immersed in water. We could not find any, however, and two exuviae were the only reward of a most careful search. This bog and others of the same kind were the home of many other dragon-flies, but I shall make mention of only two or three of the Damsel-flies or Agrionidae (Fig. 7), a large group which I have as yet scarcely alluded to. Some 18 species were taken in the vicinity of Go Home Bay, two of which were new to Canada. These Agrionids are the small delicate forms that flit about in such large numbers among the grass and sedge about the margins of lakes and streams. One of the smallest of our species *Nehallennia gracilis*, Morse, and a new addition to the Canadian fauna, we found in vast numbers in every sphagnum bog. It is an exceedingly delicate little bronze-green insect, the under parts yellowish-green and the end of the abdomen beautifully tipped with pale blue, and very closely resembles the common species *N. irene*, which, however, has different haunts, preferring the shallow marshy inlets of the bay to the bogs of the small lakes.

The most familiar members of this group, however, are the beautiful little azure-blue *Enallagmas* and the larger, dark metallic-green forms with broad black or banded wings belonging to the genus *Calopteryx*. *Enallagma* was abundantly represented by 8 species, but *Calopteryx* of which *C. maculata* is familiar to every collector was exceedingly rare, it being a frequenter of woodland streams of which there were very few in the district.

Lestes is another large genus of this group and was conspicuously represented at Go Home, the large and graceful *L. vigilax* being particularly numerous in all marshy places. These forms are slender, graceful insects, generally bronze in color and are easily recognized in the field by the listless way they have of resting upon a grass stem or reed with the wings half spread. Other Agrionids keep their wings folded together over the back, while in the rest of the dragon-flies they are held in a horizontal position.

These *Lestes* are among the later dragon-flies to appear and are common until well on in September, when almost the only other survivors of the group are the *Aeschnas* and the various species of *Sympetrum*, those hardy little red fellows which are so abundant in late summer and fall. The dragon-fly season, in fact, begins to wane before the end of July, though a host of forms are still abroad in August and several species do not appear until the month has begun. We have, however, dealt with a sufficient number to indicate the nature of this part of our summer's work at the station and the character of the fauna in that region. Fifty-eight species were taken and the nymphs or nymph exuviae of nearly half that number, and it is to be hoped that the work will be continued year by year until the life histories are known not only of the dragon-flies but of all the aquatic insects of the region.

A PRELIMINARY LIST OF THE SCALE INSECTS OF ONTARIO.

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The following list of 48 species is certainly not a complete one for our province, but may serve as a basis for further work by other collectors. Twenty-eight of these are found on forest trees, 8 on fruit trees, 10 on shrubs, 9 on greenhouse plants, 2 on weeds, 2 on staple crops, and 1 in nest of ants.

I am deeply indebted to Prof. J. G. Sanders and Prof. C. L. Marlatt, Bureau of Entomology, Washington, for identification of many of the species. I owe thanks to Mr. L. Caesar for his assistance in describing many of the insects. To the following, also, my gracious acknowledgment is due for assistance in various ways: Dr. Bethune, O. A. College; Dr. Fletcher, Dominion Experimental Farm, Ottawa; Prof. C. C. James, Thomas Rivett and Percy Hodgetts, Department of Agriculture, Toronto. Many of the illustrations are after Lochhead (the San José Scale and other scale insects).

Ortheziinæ.

(Arranged according to a Catalogue of Coccidæ of the World, by Mrs. Fernald.)

90 Orthezia Americana, (Walk)—Artemisia sp., Woodstock.
98 Orthezia insignis, (Dougl.)—Palm, Greenhouse, Toronto.

Dactylopiinæ.

192 Asterolecanium variolosum, (Ratz.)—Oak, (Quercus sp.)—Niagara, Ottawa.
254 Kermes Pettiti, (Ehrh.)—White Oak (Quercus alba), Toronto.

255 Kermes pubescens, (Bogue)—Bur Oak (Quercus macrocarpa)—Guelph, Perth, Toronto.
279 Gossyparia spuria, (Modeer)—American Elm (Ulmus americana)—Toronto.
391 Phenacoccus aceris, (Sign.)—Soft Maple (Acer saccharinum), Amherstburg, Ont.
401 Phenacoccus Dearnessi, (King)—Hawthorn (Cratægus sp.), London.
454 Pseudococcus citri, (Risso)—Many species of plants, greenhouse, Ont.
490 Pseudococcus longispinus, (Targ.)—Many species of plants, greenhouse, Ont.
529 Pseudococcus trifolii, (Forbes)—Clover roots (Trifolium repens)—Collingwood.
572 Ripersia lasii, (Ckll.)—Nests of ants, Toronto.
699 Pulvinaria vitis (L.), (Rathvon)—Acer sp., Salix sp., Ilex verticillata, Cratægus sp., Tilia americana, Viburnum pubescens, Western Ontario.
661 Pulvinaria floccifera, (Westwood)—Brassia sp., greenhouse, Ottawa
848 Coccus hesperidum, (Linn.)—many species of greenhouse plants, greenhouse, Ont.
860 Coccus pseudohesperidum, (Ckll.)—Cattleya, greenhouse, Guelph, Ottawa.
959 Eulecanium quercifex, (Fitch.)—Red Oak (Quercus rubra), Jubilee Point, Lake Ontario.
918 Eulecanium caryæ, (Fitch)—Am. Elm (Ulmus americana); Hawthorn (Cratægus sp.)—Guelph, St. Catharines.
921 Eulecanium cerasifex, (Fitch)—trees, shrubs and vines of all kinds. All parts of settled Ontario.
935 Eulecanium Fletcheri, (Ckll.)—White Cedar (Thuja occidentalis), Guelph, Ottawa.
950 Eulecanium nigrofasciatum, (Perg.)—Soft Maple (Acer saccharinum), St. Catharines, Walkerville.
902 Toumeyella pini, (King)—Austrian Pine (Pinus Austriaca), London.
Toumeyella liriodendri, (Gmel.)—Tilia Americana, Ottawa.

DIASPINÆ.

1036 Chionaspis Americana, (Johnson).
1055 Chionaspis furfura, (Fitch)—Pyrus, Cratægus, Ontario.
1062 Chionaspis Lintneri, (Comst.)—Alder (Alnus incana), Dogwood (Cornus stolonifera), London, Guelph, Rondeau, Ottawa.
1073 Chionaspis pinifoliæ, (Fitch)—Pinus and Picea, Ontario.
1081 Chionaspis salicis, (Linn.)—Leatherwood (Dirca palustris), White Ash, (Fraxinus americana), Guelph.
1096 Aulacaspis Boisduvalii, (Sign.)—Palm, greenhouse, Guelph.
1127 Aulacaspis rosæ, (Bouche)—Rose, Raspberry, etc., Ontario.
1143 Hemichionaspis aspidistræ, (Sign.)—Pteris serrulata, Ottawa.
1199 Aspidiotus æsculi, (Johnson)—Tilia americana, Toronto, Brantford, Guelph.
1200 Aspidiotus ancylus, (Putn.)—Weeping Willow, Am. Elm, Belleville, Ottawa, Toronto, St. Catharines.
1220 Aspidiotus diffinis, (Newst.)—Basswood (Tilia americana), Guilds.
1229 Aspidiotus Forbesi, (Johnson)—Beech, Fragrant Currant, Apple, Plum and Hawthorn—London, Ottawa, Niagara District.
1233 Aspidiotus hederæ, (Vall.)—Oleander, etc., greenhouse, Ontario.
1239 Aspidiotus juglans-regiæ, (Comst.)—Apple, Willow, Cottonwood, Niagara, Collingwood.

1250 Aspidiotus Osborni, (Newell and Ckll.)—Quercus alba, Betula lutea—Guelph, Toronto.
1252 Aspidiotus ostreæformis, (Curt.)—Apple, Pyrus, Maple, (Acer saccharinum, Hawthorn, Ontario.
1256 Aspidiotus perniciosus, (Comst.)—Apple, Pear and many shade trees—Niagara district, London, Aylmer, Essex district.
1270 Aspidiotus ulmi, (Johnson)—Ulmus americana—Guelph, Toronto.
1300 Chrysomphalus dictyospermi, (Morg.)—Cinnamon, greenhouse, Ottawa.
1305 Chrysomphalus obscurus, (Comst.)
1330 Targionia Dearnessi, (Ckll.)—Arcostaphylos uva-ursi, Bruce Peninsula, Shores of Lake Huron.
1377 Lepidosaphes Beckii, (Newm.)—imported oranges and lemons.
1431 Lepidosaphes ulmi, (Linn.)—many species of trees, Ontario.
1442 Parlatoria Pergandei, var. theæ, (Comst.)—lemon, O.A.C. greenhouse.

The San José Scale, *Aspidiotus perniciosus*, (Comst.), figs. 10-14.

Wherever it occurs the San José Scale is considered, and rightly so, the most destructive insect that fruit growers have to combat. Fortunately for us, however, in Ontario it is confined to the south-western portion of the province.

The mature female scale is small, circular, 1-2 mm. in diameter, only slightly convex, grayish brown in color except the central part, which is often of a lighter shade, being usually a light yellowish-brown color. The exuviæ or larval skin is centrally situated, or nearly so. The surface is fairly smooth. Sometimes a sooty fungus (*Fumago salicina*) darkens the color of the scale.

The male scale is much smaller and different in shape. It is oblong instead of circular, and about twice as long as broad, but the total length is only about half the diameter of the female. The exuvial part is not central, but situated near one end. The color as a rule is considerably darker than that of the adult female.

The usual appearance of the wintering stage of the female scale is different from the summer form, being very small, almost black and circular, with exuvial part central. There is a distinct nipple with a ring or depression around it.

There are four other Aspidiotus scales found in Ontario which are very difficult to distinguish from the San José scale. The particular points of difference between each of these and the San José scale will be discussed as these scales are respectively taken up. It should be noted, however, that if one takes his knife and cuts off a slice from a twig or branch affected with San José scale the cambium and some of the sap-wood just beneath the bark will be seen to be colored purple. This purplish color is very often seen also on the surface of the bark, and on the fruit around where the scale is situated.

Though the scale insects are in all stages when winter comes on, yet by far the majority of the females are of the type described above under the heading of the wintering stage. In the spring, about the end of May, though this year not until the middle of June, the winged males come forth and fertilize these half-grown females. About a month after this, the latter begin to give birth to living young. About eight or ten young are born in a day as a rule, and a single female continues to reproduce at this rate for about six weeks, when she dies. A young female takes about forty days to mature and then in turn begins to produce living young. In this way we find that all stages of the insects are to be found all through the summer until the frost stops the reproduction. So very prolific is the insect that it has been calculated that if every scale were to live and mature, 3,000,000,000 individuals could be traced back to a single fertilized female in one summer. Hence it

is easy to understand why the scale so quickly destroys infested trees. It is usually found that if no steps are taken to check the pest, it will kill young thrifty trees in three years.

Almost any kind of fruit trees and bush fruits are liable to be attacked by the scale. Many shade and forest trees are also attacked.

Remedies.

(1) There is one great standard remedy that has given good satisfaction whenever carefully made and thoroughly applied, namely, the lime-sulphur wash. This should be put on in the spring, or in badly infested orchards it will pay to give the trees a double dose, one in autumn as soon as the leaves fall and the other in the spring before the buds have burst.

(2) Kerosene emulsion, whale oil soap, and a number of other ready-made oil washes, like Scalescide, give fairly good results. They have not, however, been found to be so reliable as the lime-sulphur wash, and in addition are much more expensive.

Before any tree is sprayed it should be carefully pruned and the branches thus removed should be burned.

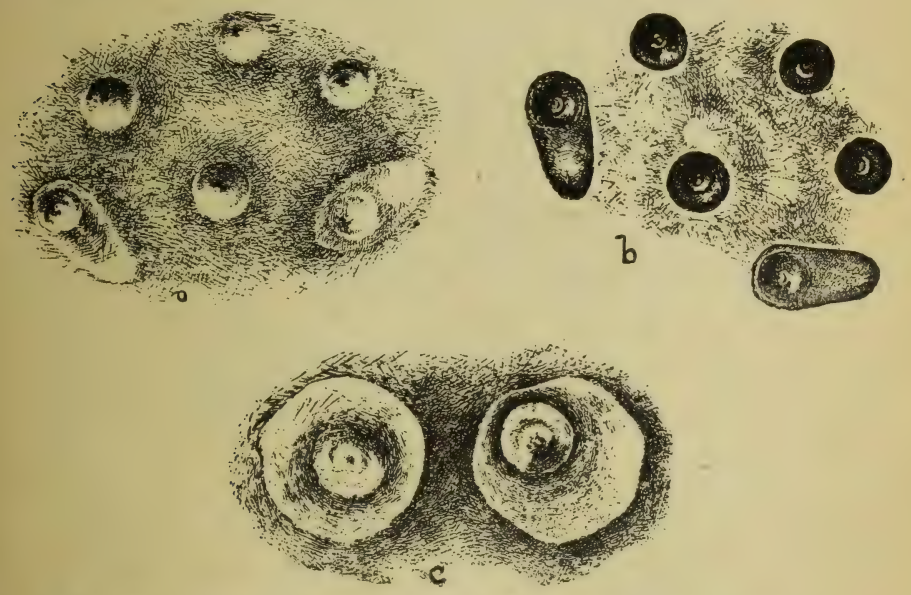

FIG. 10. San José Scale (*Aspidiotus perniciosus*). (*a*) Four young scales and two male scales, showing the nipple and ring even in the very young forms; (*b*) four immature female scales, and two nearly grown male scales, showing the prominent nipple and circular groove about the nipple, of the black scales; (*c*) two small female gray scales, showing the central nipple and circular groove. One scale has a nipple not central. The body of insect is beneath the scale.

Parasites.

(1) Two small Chalcid flies, *Aphelinus mytilaspidis* (Le Baron), and *Aphelinus fuscipennis*, (How.)

(2) Two ladybird beetles, *Pentilia misella*, (Lec.), fig. 15, and *Chilocorus bivulnerus*, (Muls.)

(3) In some districts a fungus ,*Sphærostilba coccophila*. It is difficult to say whether the latter is at work in Ontario.

Note.—At the 1906 meeting of the Entomological Society of Ontario, I gave observations on a scale insect, which I thought to be the San José scale, in gardens at Toronto. Since that time I have made a more careful microscopic examination, and find it to be *Aspidiotus ostreæformis* or Curtis scale. The bark around the scale was pink, much like the appearance of the San José scale infested bark.

FIG. 11. San José Scale larva, the active crawling form, showing the two feelers, six legs, and long sucking tube; (*b*) enlarged drawing of anal plate.

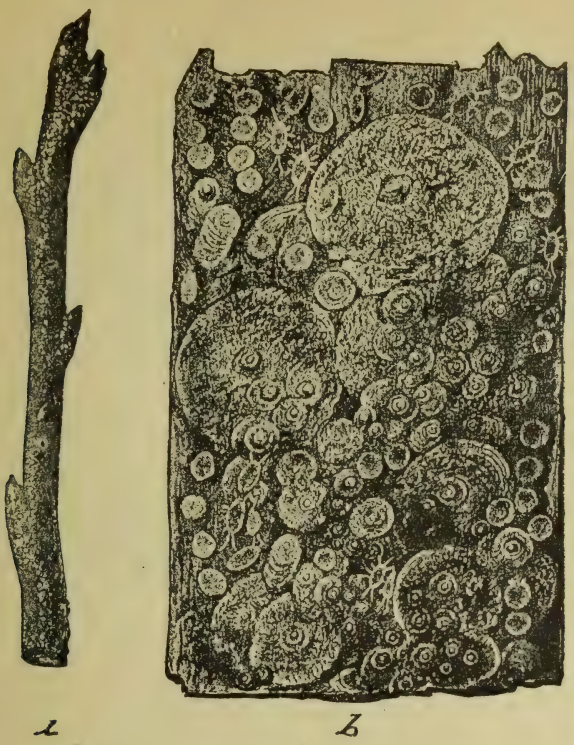

FIG. 12. A portion of branch covered with San José Scale. Appearance of scale on bark; (*a*) infested twig, natural size; (*b*) bark as it appears under hand lens, showing scales in various stages of development and young larvæ.

FIG. 13. Adult male insect of San José Scale, escaped from covering scale, showing the two wings, two feelers, two eyes, six legs, and long anal style. (Div. Ent. U.S. Dept. Ag.)

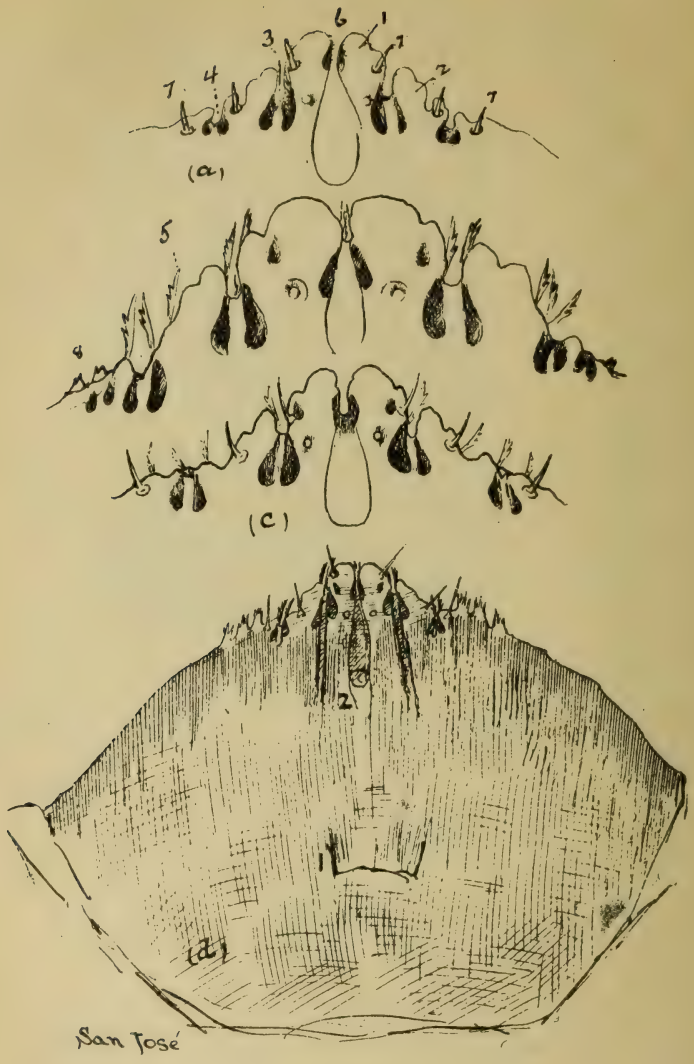

FIG. 14. Anal plates of female San José Scale. (*a*) Anal plate, showing median lobe (1), second lobes (2); incisions (6), (3), (4); chitinous thickenings on each margin of these incisions, and the spines (7) on each of the lobes. (The plates have not been drawn in this case). (*b*) Anal plate, showing the lobes, incisions, thickenings, and plates (5) a pair of plates between median lobes, a pair at first incision, and three at second incision. Notice the large size of second lobe, which is notched once on the margin. (Spines have not been drawn). (*c*) Anal plate, showing both spines and plates. Notice the chitinous thickenings between the median and second lobes are nearly equal in size and close together. (*d*) Anal plate and last segment of adult female. There are no ventral glands. (1) Vaginal opening; (2) anal opening.

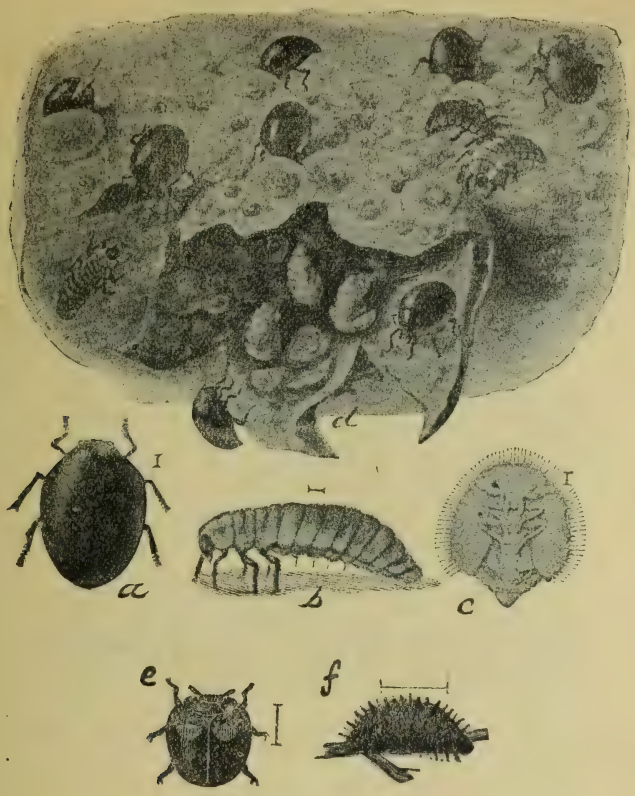

FIG. 15. Two enemies of the San José Scale. (*a*) Beetle; (*b*) larva; (*c*) pupa of Pitiful Lady-beetle (*Pentilia misella*); (*d*) blossom end of pear, showing scales with larva and beetles feeding on them; (*e*) Twice-stabbed Lady-beetle (*Chilocorus bivulnerus*); (*f*) its larva. (*a*, *b*, *c* and *d* after Howard, & Marlatt, *e* and *f* after Riley).

Curtis scale (*Aspidiotus ostreæformis* Figs. 16-18.

This scale is much more widely distributed throughout Ontario than has been hitherto supposed, but in spite of its prevalence, it does not seem to be very destructive.

The adult female resembles the San José in being circular and having the exuviæ centrally situated as a rule, though with many exceptions. It differs, however, in several important particulars: (1) It is considerably larger, averaging about 2 mm. in diameter, whereas the San José averages about 1.4 mm. (2) It is much more convex. (3) A smaller proportion of the exuvial part is light colored, in fact only the nipple, whereas a considerable part of the central portion of the San José was lighter than the general color of the scale. (4) There is a light or whitish colored margin to be seen around the outside of most of the scales. (5) The surface is rougher. (6) The usual winter form is not nearly black like the San José but is a whitish brown, and has no ring or depression around a distinct nipple.

This scale passes the winter in mature condition for the most part. It matures about the end of June. Like the San José it brings forth living young which continue to be produced throughout nearly all of July. There is, however, only one generation in a year.

The scale has been reported to us or found by us in very many places in Collingwood on the west to Trenton in the east.

Its chief food plants in Ontario seem to be the apple and pear. It is said, however, to attack also the plum, cherry, currant, mountain ash, elm, basswood, Carolina poplar, and willow.

Natural enemies:

(1) A white fungus, commonly attacks it at Guelph. See Plate D.

(2) A few of the scales were perforated in a manner characteristic of Chalcid flies, so that it is probably attacked by one of these tiny parasites.

Remedies:

Scrape the rough bark off the trunks of trees and use the same remedies as for San José scale.

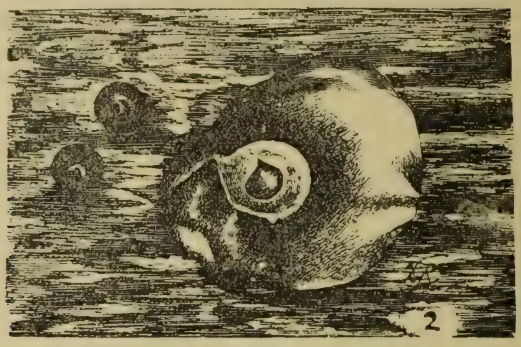

FIG. 16. Curtis Scale (*Aspidiotus ostreæformis*), greatly magnified.

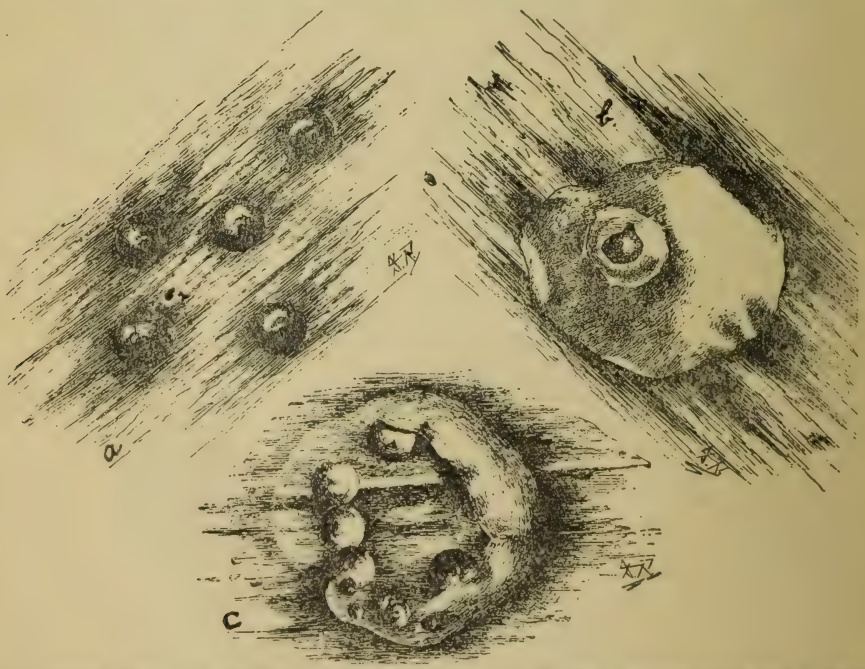

FIG. 17. Curtis Scale (*Aspidiotus ostreæformis*). (*a*) Young scales which are not nearly full-grown; the nipple is plain, but the circular grove about it is wanting; (*b*) Full-grown pregnant female; the nipple is large; (*c*) old scale with several young scales hidden beneath it—a characteristic feature.

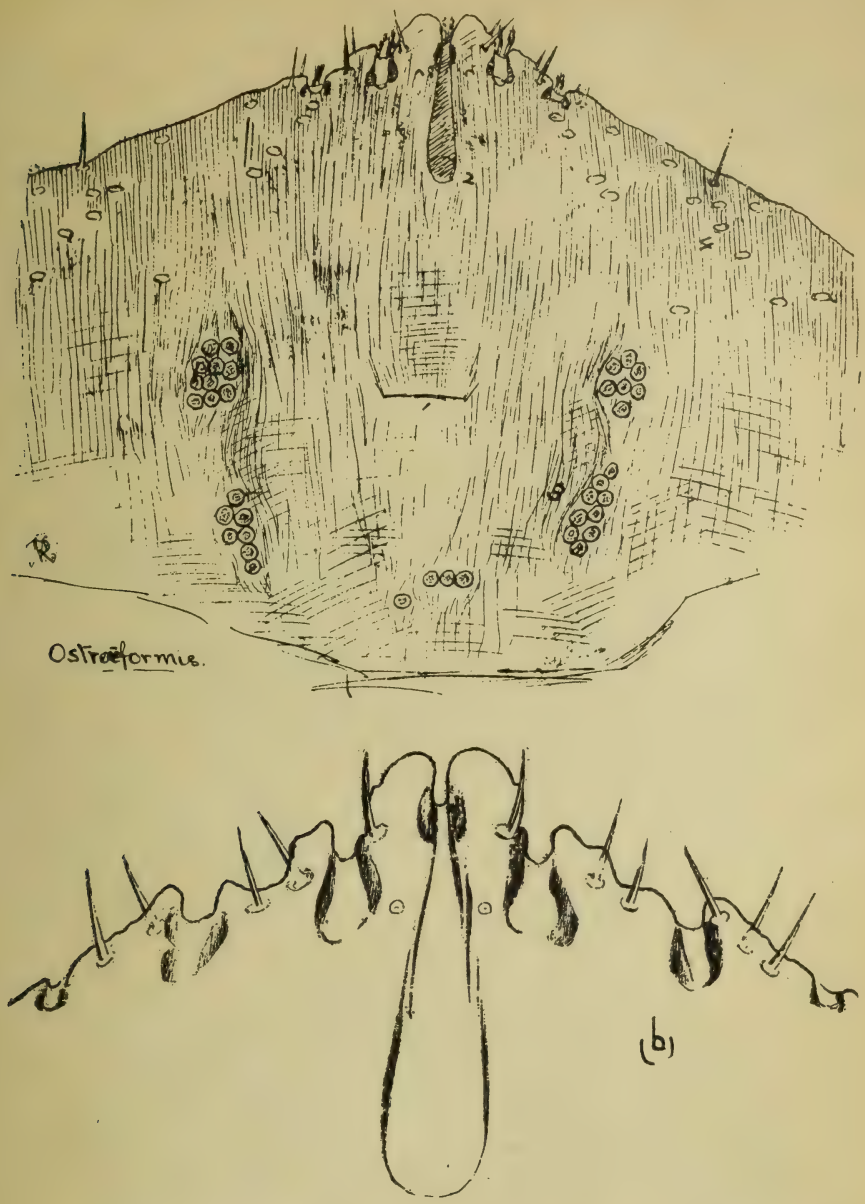

FIG. 18. Anal plate of Ostreæform or Curtis Scale, showing lobes, incisions, thickenings, and spines. The inner angles of second lobe are decidedly developed; outer lateral margin of second lobe undulating; chitinous processes of first incision long and nearly equal in size; (*b*) anal plate much enlarged.

The Cherry Scale, *Aspidiotus Forbesi* (Johnson). Figs. 19 and 20.

The Cherry Scale, although found in several localities in Ontario, has not yet, with one or two exceptions, been reported as doing much damage.

The adult female scale is circular, nearly smooth, slightly convex, about 1.3-1.5 mm. in diameter, and has the exuviæ usually centrally situated. The general color varies from a yellowish brown to a greyish yellow. The exuvial part is usually orange.

The adult female scale is very difficult to distinguish from the San José. The San José, however, has the exuviæ light brown, the Cherry has orange exuviæ. The immature San José scales are often dark and have a distinct nipple, with a ring or depression around it; the immature Cherry scales are much the same color as the mature scales and there is not the same prominent nipple and encircling ring. Furthermore the San José scale discolors the fruit, bark and cambium layer, the Cherry scale does not.

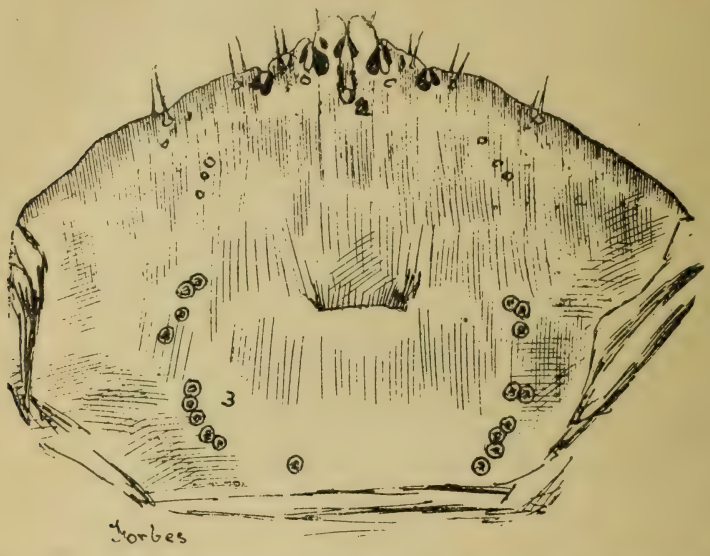

FIG. 10. Anal plate of Forbes Scale, showing lobes, incisions, thickenings, and spines; also anal opening (2), vaginal opening (1), and ventral glands (3). Notice that the median lobes approximate at apex, and that the inner thickening at first incision is very large and club-shaped.

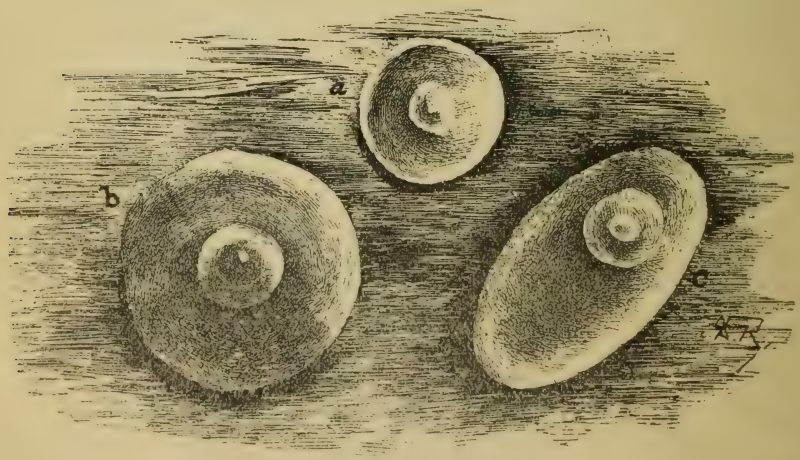

FIG. 20. Forbes or Cherry Scale. (*a*) Young scale, light colored, with central nipple but no circular groove; (*b*) adult female scale with central or nearly central, orange-colored nipple, and gray outer margin of scale; (*c*) male scale, showing the oval shape, and nipple near one end. The body of the insect is under the scale.

The life history of this scale is said to be as follows: It passes the winter in a partly grown stage. The males emerge about the end of April. In May the young begin to come forth and eggs and young may both be found up to about July. There are two broods in some of the American States, but whether there is more than one in Ontario has not yet been discovered.

The Cherry scale has been found in Ontario at Ottawa, London, St. Catharines, Grimsby, and in Prince Edward county.

The host plants so far discovered are cherry, apple, hawthorn, fragrant currant, and beech.

Remedies:

The same remedies should be used as for the San José scale.

Natural Enemies:

Several species of Chalcid flies are said to attack it, also a tiny white mite, and the twice-stabbed ladybird beetle (*Chilocorus bivulnerus*, Muls.)

The English Walnut Scale (*Aspidiotus juglans-regiæ*, Comst.) Figs. 21 and 22.

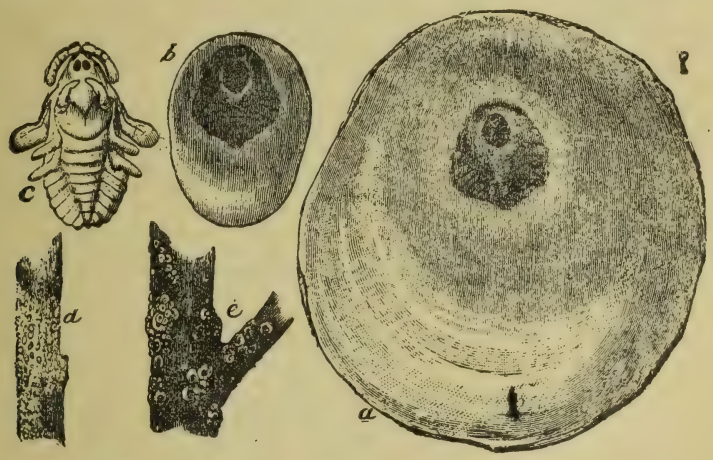

Fig. 21. The English Walnut Scale (*Aspiodiotus juglans-regiæ*). (*a*) Female scale; (*b*) male scale; (*c*) male chrysalis; (*d*) male scales on twig; (*e*) female scales on twig. *a*, *b*, *c*, enlarged; *d*, *e*, natural size. After Howard. From U.S. Dep. Agr., Year Book for 1894.

Fig. 22. Anal plate of English Walnut Scale, showing the large median lobes, and notched outer margin of second lobe.

The English Walnut scale has been found in Ontario in only two or three localities, although it probably exists in several others. If some sam-

ples from Collingwood, sent by this department to Washington, and thought by the authorities there to belong to this species, should prove to be really such, the scale is capable of doing great injury to the trees it attacks. The poplars and willows at Collingwood on which it was found were very thickly covered, and were dying, apparently from the effects of the scale.

The adult female scale is larger than any other species of Aspidiotus described in this paper, averaging almost 3 mm. in diameter. It is circular or nearly circular in outline, very flat for its size, resembles closely the color of the bark it is on, being usually a pale grayish brown. The exuviæ are usually eccentric and are orange or reddish in color, though often this color is partly concealed by a waxy secretion.

Though the adult female of this scale is easily distinguished from the San José by its large size and reddish eccentric exuviæ, yet the winter stage of some specimens we have received is with great difficulty distinguished from the winter stage of the San José. The chief points of distinction seem to be: (1) The winter stage of the Walnut scale is a little larger than that of the San José; (2) Even in these winter scales, the reddish exuviæ can often be seen with the aid of a lens although a waxy secretion almost conceals it. In the San José scale this reddish color does not appear.

We have very little knowledge of the life-history of this scale. From specimens we have seen this autumn it seems to pass the winter for the most part in an immature stage. It does not bring forth its young alive but lays eggs. There is probably more than one brood in a season.

The scale has been found only at Grimsby and Collingwood (?)

The host plants so far discovered in Ontario are apple, willow and poplar.

Remedies:

The same remedies should be used as for the San José scale.

We have not been able to observe what natural enemies this scale has.

The Putnam Scale, *Aspidiotus ancylus*, (Put.) Fig. 23.

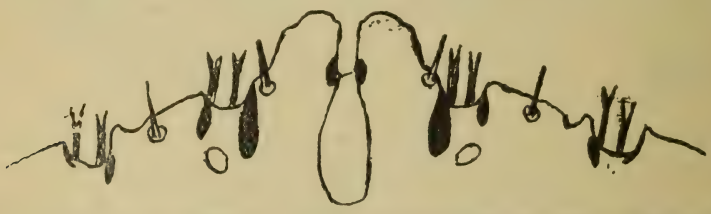

Fig. 23. Anal plate of the Putnam Scale, showing the unequal thickenings in first incision, the rudimentary second lobe, and the wide interval between median and second lobes.

The Putnam scale is distributed fairly widely throughout Ontario. It has not, however, been known to do much damage in the province although in some of the states across the boundary it is said to have been quite destructive.

The adult female scale is usually more nearly oblong than circular, about 1.5 mm. long, 1-1.3 mm. wide, and slightly convex. The general color is greyish black, varying somewhat with the color of the bark it is on. The exuvial part is eccentric and practically always red or reddish. Sometimes this red color is obscured by a whitish film which can easily be rubbed off.

This scale can be easily distinguished from the San José by its oblong shape and the red eccentric exuviæ. It has the peculiarity of producing in a small degree the purplish color so characteristic of the San José scale.

It passes the winter in a nearly full grown stage. The males begin to appear, it is said, in May. In late spring or early in summer the female lays from 30 to 40 eggs. These hatch in July. There is only one brood in a season.

The scale has been reported from Ottawa, Toronto, Belleville, St. Catharines, and Kingsville.

It has been found on plum, elm, and willow in Ontario, but is said to attack also cherry, apple, red currant, maple, oak, ash, and beech.

Remedies:

The same remedies should be used for this scale as for San José.

Parasites:

The only parasite we have heard of as attacking it is a minute Chalcid fly, *Coccophagus varicornis*, (How.)

Osborn's Scale (*Aspidiotus Osborni*).

Osborn's scale is found on forest trees in northern and western Ontario.

The mature female is about the same size as the Curtis scale, averaging about 2 mm. in diameter. It is very smooth and circular, and the exuviæ is eccentric. The general color is brown, varying somewhat with the color of the bark of the host; under the loose bark of the paper birch the color is gray.

It has been found on paper birch, yellow birch, cottonwood, and white oak.

It passes the winter in a nearly full grown stage.

Parasites:

The work of Chalcis flies have been found on several occasions.

The New York Plum Scale, *Eulecanium cerasifex* (Fitch.) Fig. 24.

The New York Plum Scale has become one of our most common scales and like the Oyster-shell scale has spread over practically the whole province. Though not so destructive as the Oyster-shell, it is often quite injurious where abundant and sometimes kills the infested tree.

The scale is one of our largest species. The mature female is nearly hemispherical, but usually a little longer than broad, being 3-5 mm. and 2.5-4 mm. wide. It varies in color from light brown to almost black. The surface is usually glossy with, however, numerous little depressions and elevations which sometimes take the form of grooves and ridges radiating from the apex to the base.

The male scale is very unlike the female in shape, size and color. It is elongated in form, 2-2.5 mm. long, and 1 mm. wide, only slightly convex, and is grayish white in color. Both male and female scales are found near each other on the same branch.

The winter is passed by both sexes in the half-grown stage. The winged males appear June 1st (this year, 1907, it was June 12th), and soon after this the females lay their eggs and die, but their dead body still remains as a cover for the egg mass. About the end of June (this year on July 19th), the eggs begin to hatch out. There are sometimes about 1,000 eggs laid by a single scale. The young scales move from the branches to the leaves where they remain until autumn and then migrate back to the branches for the winter. There is only one generation in a year.

We have found this scale on a great range of trees and other plants at Guelph, the following being the list as observed up to date of writing:—apple, plum, pear, mountain ash, hawthorn, currants, gooseberry, wild red

raspberry, wild black currant, wild grape, Virginia creeper, elder, red-osier dogwood, mountain maple, black maple, silver maple, white ash, black ash, beech, blue beech, ironwood, basswood, alder (Alnus incana), poplar (Populus alba), rock elm, American elm, prickly ash, butternut, black walnut, catalpa, hazel-nut, pin-cherry, bur oak, English oak (*Quercus robur*), sweet hickory, and many species of herbs near infested trees.

Remedies:

(1) The lime sulphur spray. This must be very carefully put on as the scales for the most part in fall, winter, and spring, are to be found on the lower side of the branches.

(2) Kerosene emulsion, applied when the tree is dormant, preferably as soon as the leaves fall in autumn. Dilute the stock emulsion with four parts of water.

(3) Kerosene emulsion, flour kerosene, or whale-oil soap at ordinary strength applied as soon as eggs have hatched, which must be determined by actual observation each year.

FIG. 24. Twig of plum infested with Lecanium or New York Plum Scale. (*a*) The old scale of the previous summer empty and lifeless; (*b*) the immature wintering scales, which will become full grown like (*a*) next June.

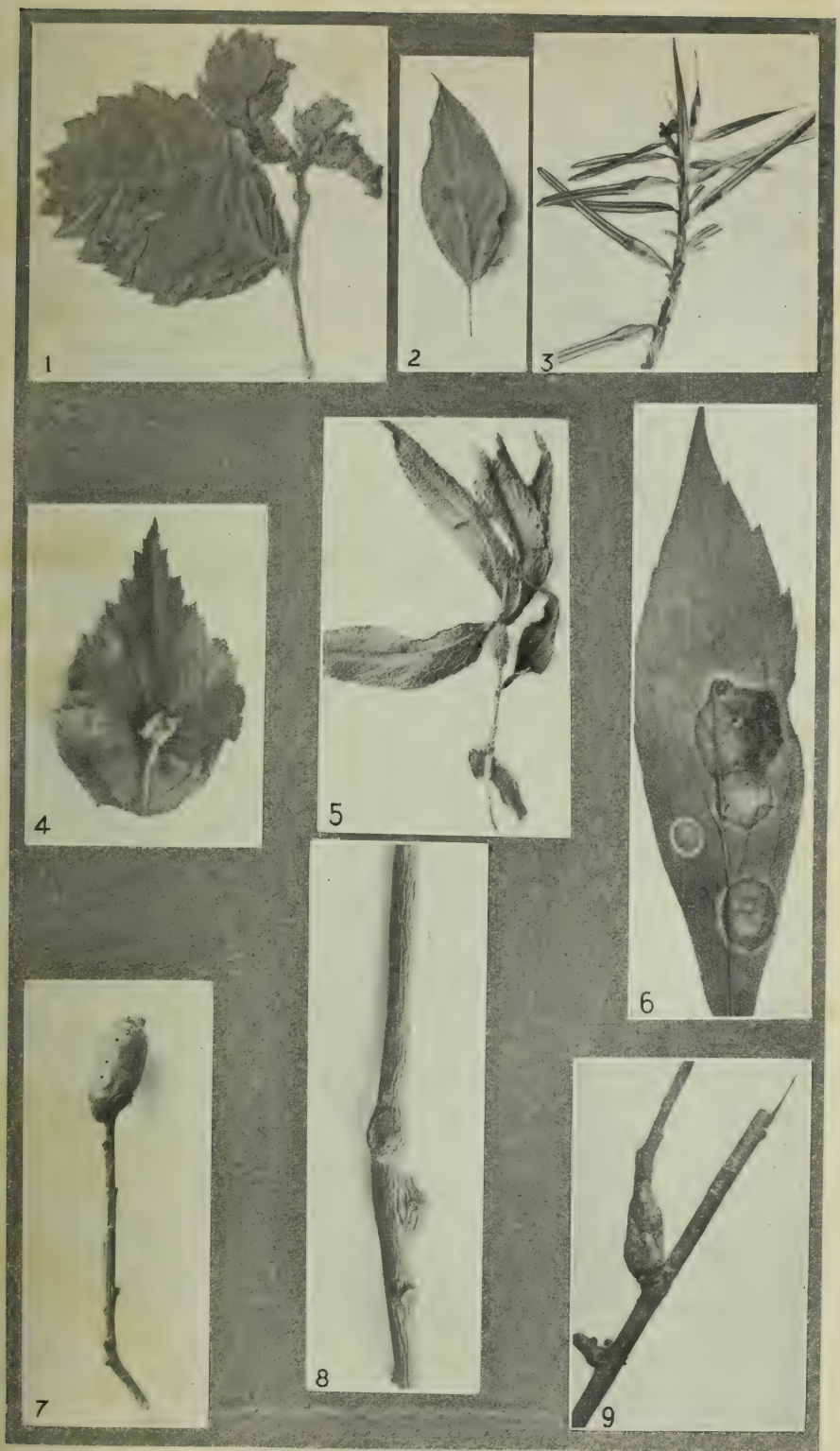

PLATE A.

1. Cecidomyia ulmi, Beuten.
2. Lasioptera corni, Felt.
3. Cecidomyia balsamifera, Lintner.
4. Hormomyia cratægifolia, Felt.
5. Choristoneura perfoliata, Felt.
6. Choristoneura flavolunata, Felt.
7. Rhabdophaga batatas, O.S.
8. Agromyza æneiventris, Fallen.
9. Rhabdophaga nodulus, Walsh.

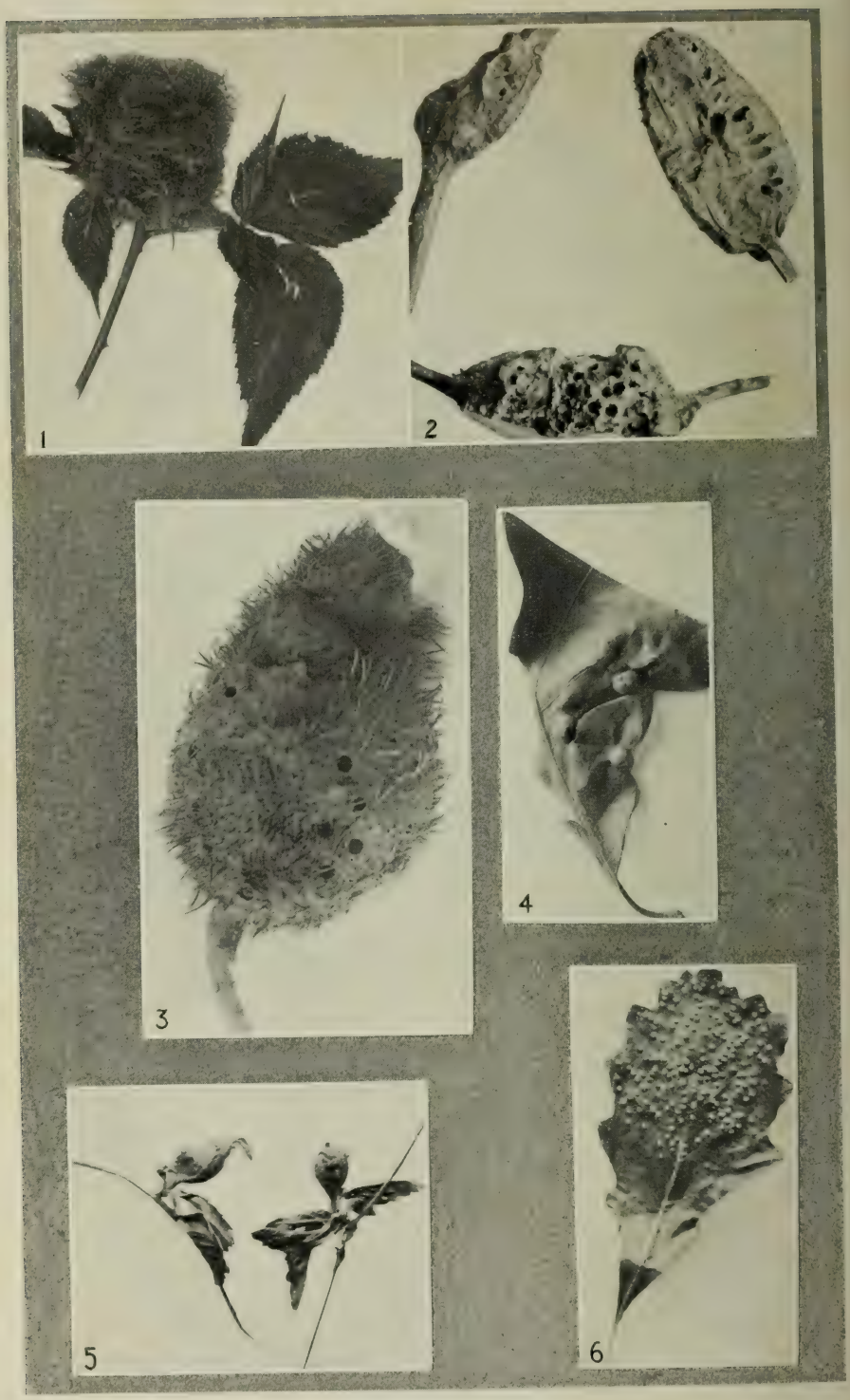

PLATE B.

1. Rhodites sp. on Blackberry.
2. Diastrophus turgidus, Bass.
3. Rhodites multispinosus, Gill.
4. Andricus futilis, O.S.
5. Diastrophus potentillæ, Bass.
6. Neuroterus umbilicatus, Bass.

PLATE C.

1. Andricus punctatus, Bass.
2. Biorhiza forticornis, Walsh.
3. Andricus clavula, Bass.
4. Cynips strobilana, O S.
5. Andricus papillatus, O.S.
6. Andricus topiarius, Ashm.
7. Eucosma scudderiana, Clem.
8. Pemphigus ulmi-fuscus.

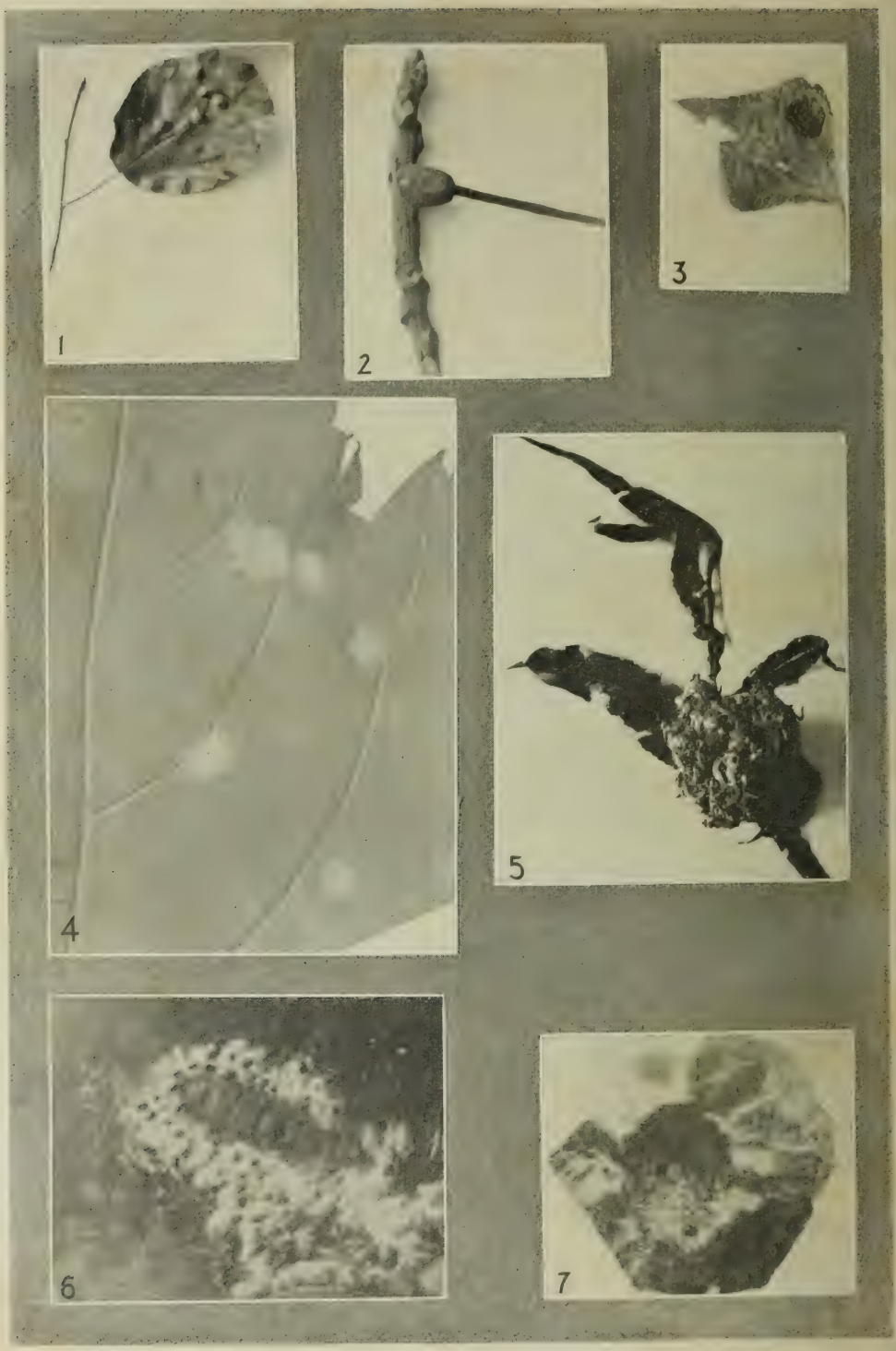

PLATE D.

1. Eriophyes sp., Amelanchier Canadensis.
2. Eriophyes sp., Juglans nigra.
3. Eriophyes sp., Populus italica.
4. Eriophyes sp., Vitis cordifolia.
5. Eriophyes sp., Salix fragilis.
6. Young Oyster-shell scales parasitized by a fungus.
7. Curtis scale parasitized by a fungus.

Parasites:

(1) A fungus disease (Cordyceps clavulata), attacks and destroys many of the scales.

(2) At least 3 chalcid flies, *Pachyneuron altiscuta* (How.) *Eunotus lividus* (*Ashm.*), and *Coccophagus cognatus* (How.)

(3) Several species of lady-bird beetles.

(4) A large flesh-colored species of larva was found feeding on the eggs but we were not able to rear the adults.

The Terrapin Scale, *Eulecanium nigrofasciatum* (Perg.)

This scale was first discovered in Ontario in 1901 at St. Catharines. Up to the present time it has been reported to us only from St. Catharines, Walkerville, and Windsor. In each case the infested twigs forwarded were taken from maple trees and these were literally covered with the scale. It is clear from such specimens that a badly infested tree would soon die, and so the scale is one to be guarded against. Mr. Sanders of the Bureau of Entomology, Washington, in his circular No. 88, says that the scale must be considered a "dangerous pest."

The easiest time to recognize this scale is in the winter stage. At this season it is considerably smaller than the New York Plum scale, *Eulecanium cerasifex*, which, even when mature, it never equals in size. It has the same general shape as this well known scale, being nearly hemispherical. It is about 2 mm. in length and slightly less in width. Along the top running longitudinally is a reddish streak or stripe about 1 mm. long and .3 mm. wide. The rest of the surface is usually mottled red and black, the red forming the ground, so to speak, and black stripes radiating from the reddish top to the base. Sometimes the black forms a belt around the scale extending from the red boss or crown nearly to the base, which has also often a red margin in such cases. Not uncommonly a scale looks almost entirely red or on the contrary almost entirely black. When mature there is still the same general color and shape but there is an increase in size, the scale now being 3-3.5 mm. long and somewhat less than this broad. Later in the season the color fades.

A peculiarity, at least, of the winter stage of the scale is that when punctured or crushed, a reddish liquid exudes from the wounds.

The eggs are laid in the spring and hatch about the end of June. In August the tiny winged males emerge and consequently the half-grown females are fertilized the same season.

Although only maple trees have been reported to us as being attacked up to the present time in Ontario, yet we find that in the United States the scale infests not only these but also the peach, plum, apple, pear, quince, hawthorn, and several other trees. Hence it is clear that fruit-growers should be on their guard against it.

Remedies:

The lime-sulphur wash has proved a failure in the case of this scale and the most satisfactory remedy so far discovered is to spray the trees carefully when the leaves are off with kerosene emulsion of about 25 per cent. strength. Care should be taken to prevent the emulsion running down the trunk and getting to the roots which it would probably injure. Late autumn or early spring before the buds begin to burst would be the proper time to spray. While this is practically the only spray recommended against this scale insect, some very able entomologists doubt whether even it is anything like so successful as its advocates claim. Seeing that there is so much doubt about the effectiveness of washes and that the scale is capable of doing grea

damage, the proper course to take is to be on one's guard against allowing it to get a footing and, if a tree should be found to be infested, cut it down and burn it at once, thus taking no risks.

Parasites:

This scale like almost all the rest has its insect foes, a tiny chalcid fly of the genus Coccophagus has been found to attack it. A fungus parasite known as Cordyceps clavulata is not uncommon on this scale.

Eulecanium caryæ, (Fitch).

Eulecanium caryæ is said to be the largest known species of Eulecanium. It has been in Ontario for at least ten years, having been discovered by Dr. Fletcher in the Niagara district in 1898. Judging from the fact that it has been found in that district and that we have discovered it at Guelph on several trees in the forest, it probably occurs at least all over the south-western part of Ontario. From our own experience and that of others we believe that the scale is very seldom abundant on any tree; in every case where we discovered mature scales there were only two or three at most, and often only one specimen to be found on a branch (always on the under side). Consequently the scale is seldom sufficiently injurious to cause any alarm.

It is easily identified by its large size, being more than twice as large as the New York Plum scale (Eulecanium cerasifex). Like this scale Eulecanium caryæ is more or less hemispherical in shape. It is 7-10 mm. long, 6-9 mm. broad, and 3-4 mm. high. The surface is glossy, light brown to black in color, and covered with a fine powder. On all the specimens a keel-like structure ran longitudinally from end to end through the centre. The rest of the surface was more or less rugose. In some cases we could see fine (including the keel-like structure), nearly parallel longitudinal ridges; in others these ridges, except the keel, were not perceptible.

We have not yet traced out the life history of the scale, but from observations made believe that it is probably very similar to that of the New York Plum scale; that is, it passes the winter in the nearly mature stage, the males emerge in late spring; the eggs, which are very numerous and white in color, hatch out in July; the young migrate to the leaves and re-migrate to the branches in the autumn.

This scale has been found at Guelph on the hawthorn and American elm, and at St. Catharines on the peach.

Remedies:

Seldom any need be applied, but the same remedies as are used for the New York Plum scale should destroy this one.

Parasites:

There is a very little doubt that the failure of this scale, laying as it does a very large number of eggs, to increase rapidly is to a great extent due to the attacks of parasites. Dr. L. O. Howard informs us that a chalcid, Chiloneurus albicornis, (How.) attacks it. (Bull. vii, N. S. Div. Ent. U. S. Dept. Agr. 1897, p. 63). This is one of probably a considerable number of parasites.

Kermes pubescens (Bogue).

Kermes pubescens is a large scale resembling the New York plum scale and other Eulecanium scales, but differing in external appearances chiefly in being more nearly spherical. It has been found by us at Guelph, Toronto, and Perth, hence is probably wide spread over the province. Only oak trees are attacked, as it was found in abundance on each infested tree it must do considerable injury. Mr. Bogue, who discovered and named the scale, reports it as attacking the young twigs and leaves, but we have always

found it in the cracks of the bark on the trunk and branches and have not yet observed it on very young twigs or on leaves.

The mature female scale is nearly spherical as a rule in shape, though often it seems to be modified in form by its position in the cracks or fissures of the bark. It is 3-4 mm. long, 3 mm. high, varies in color from light to dark brown, often mottled with black, is shiny in appearance and covered with a short white pubescence.

The male scale resembles very much the male of the New York Plum scale. It is, however, whiter, being snow-white. In shape it is oblong, 2 mm. in length, 1 mm. in width and fairly convex.

The winter is passed by both sexes in the nearly mature stage. The males emerge about the first of June or a little earlier. This year '07 the season was late and they were observed coming forth June 12th. Though the females are fertilized shortly after this we have not yet had opportunity to discover the date when the eggs hatch.

Remedies:

(1) Kerosene emulsion 25 per cent. put on when the trees are dormant should kill the scale. The tree must be soaked, however, to ensure the spray getting into the crevices of the bark where the scales are.

Parasites:

A considerable number of the scales observed had been perforated, evidently the work of a small chalcid fly.

The Cottony Maple Scale, *Pulvinaria vitis* (L.).

The Cottony Maple Scale is by no means a stranger in Ontario. It is found all over the western part of the province at least, and probably over much of the remaining parts also. As the name indicates, it attacks the maple chiefly, and in cities often does much damage to maple shade trees. It is, however, rarely abundant for many seasons in succession, because of the attacks of parasites.

The scale is most easily identified in spring or early summer. At this time of the year it appears as a brown, elliptical, convex insect, with so large a cottony-like egg-mass protruding from behind and beneath that the scale seems to be standing on its head, or nearly so. The egg mass and scale together are about 1 cm. long, the scale itself being about 1-3 of this length. The cottony egg-mass has given the scale its name and makes its identification easy.

The young lice hatch about the middle of June usually, the hatching period extending over a couple of weeks. The tiny insects at once migrate to the underside of the leaf, though some also establish themselves on the upper surface. On the leaves they usually arrange themselves alongside the midrib and veins. About the end of August the winged males emerge and fertilize the females. A few weeks later the females desert the leaves and go back to the branches, where they pass the winter. In the spring of the year they rapidly swell, and in early summer form the cottony mass and lay their eggs in it. Hence there is but one generation in a year.

Although the maple trees are the ones most commonly attacked, the scale is found on many other trees as well. It has been found at Guelph on the following maples: Acer saccharum, A. saccharinum, A. nigrum, A. rubrum, and A. negundo; also on basswood, American elm, hawthorn, white poplar (Populus alba), scrub willow, red-osier, dogwood, ilex (verticillata), Spiræa (salicifolia) and grape vines.

Remedies.

Except in towns there is very little need of using any remedy because parasites keep the scale well in check and, as mentioned above, it is seldom bad many years in succession. In towns, await the hatching of the young, and shortly afterwards prune severely, and where valuable trees are attacked spray these thoroughly with kerosene emulsion, flour kerosene or whale-oil soap. More than one spraying will probably be necessary.

The Oyster-shell Scale, *Lepidosaphes ulmi*, (Linn.) Fig. 25.

The Oyster-shell scale is found in almost every district in Ontario, and is doing more injury to the fruit trees of the province as a whole than any other scale.

The scale can easily be recognized even without the aid of a lens. It is 2.5-4 mm. long, and .75-1 mm. wide in the broadest part, tapers toward the the end, is shaped like a diminutive oyster-shell, and closely resembles in color the bark on which it is found. The small end, or exuvia, is usually much lighter in color than the rest. The male scale differs from the female chiefly in being considerably smaller and broader in proportion to its length.

It passes the winter in the egg stage, from 20-100 eggs being concealed under the covering of a single scale. The eggs hatch about the first week in June. The tiny, white, young scale insects run about for a day or two on the bark or leaves and then insert their sucking tubes in some chosen spot from which they never move during the rest of their life. There is only one brood in a season, but even so, the scales increase very rapidly where no attempt is made to keep them in check. Badly infested trees become much weakened and often die.

Not only does this scale attack apple, pear, plum, and cherry trees, but it also attacks currants, gooseberries, rose bushes, spiræas, lilacs, and numerous shade and forest trees, such as the mountain-ash, hawthorn, red-osier dogwood, black and white ash, American aspen, prickly ash, mulberry, and horse-chestnut.

Remedies.

There are several remedies that can be used with success in combating it: —

(1) Spray with kerosene emulsion, flour kerosene, or whale-oil soap during June as soon as all the eggs seem to have hatched. This date can easily be ascertained by examining carefully, even with the naked eye, a few infested branches. These remedies are the most popular.

(2) The lime-sulphur wash. This remedy, though not so popular as No. 1, has given excellent results when well made and carefully put on late in the spring when the buds are well swollen or are opening.

(3) Whitewash. The trees must be sprayed twice, with an interval of a few days between, with whitewash. This should be done as soon as the leaves fall in the autumn. Use 1 to 2 lbs. lime to 1 gal. water.

Parasites.—The most common parasites are: (1) A tiny little mite, probably *Tyroglyphus malus*, that preys both upon the adult and the eggs; (2) a small, yellowish chalcid fly, probably *Aphelinus mytilaspidis*, Le Baron, the larva of which preys upon the eggs (scales perforated by small, round holes have been parasitised by this kind of insect); (3) certain species of ladybird beetles, especially the twice-stabbed lady beetle (*Chilocorus bivulnerus*) Muls. This year we found a pink fungus attacking the young scales, and on a mountain ash tree, in Toronto, which was covered with scales, the pink fungus parasitised and killed nearly all the scales on the tree. (See Plate D. Fig. 6.).

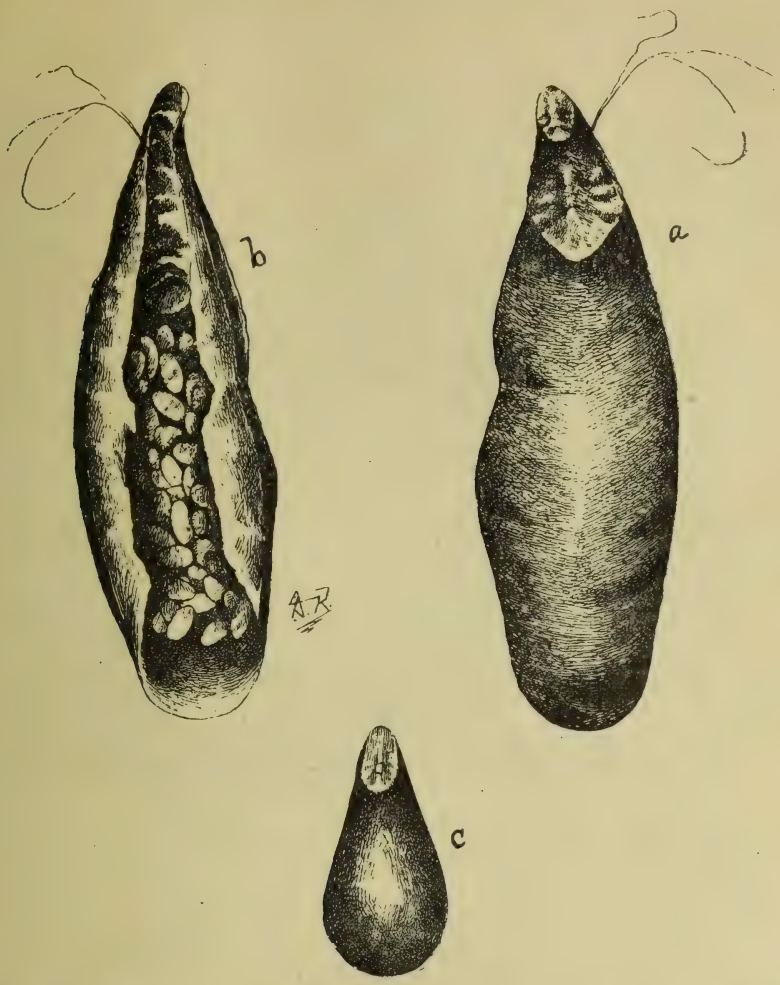

FIG. 25. Oyster-shell Barklouse (*Lepidosaphes ulmi*). (a) Adult female, back view, showing the two moulted skins at anterior end, and the bristles of the sucking tube; (*b*) adult female turned over, showing the insect at the anterior end and the eggs at the posterior end; (*c*) adult male scale, much smaller than female, with one moulted skin at anterior end.

The Scurfy Scale, *Chionaspis furfura*, (Fitch). Figs. 26 and 27.

The Scurfy Scale, though widely distributed throughout Ontario, is seldom found in so great abundance as the Oyster-shell. Badly infested trees or other plants are very much weakened and not infrequently die as a result.

The mature female scale is somewhat of the shape of the Oyster-shell, but is much broader in proportion to its length, and is more properly described as pear-shaped, being 2-3 mm. long, 1-2 mm. wide in the broadest part and tapering rapidly to a fine point at one end. It is very slightly convex and is grayish white in color. The scurfy appearance which it gives to a badly infested branch or twig has evidently been the cause of its receiving its present popular name.

The male scale is very different from the female. It is elongate in shape, is only about 1-3 the length of the female, is whiter in color and has three parallel longitudinal ridges on its back (tricarinate).

The Scurfy Scale has a very similar life history to the Oyster-shell. It passes the winter in the egg stage, there being from 20-80 purplish red eggs under a single scale covering. About the first of June these hatch into tiny orange or reddish brown larvæ, which run about freely for a few hours, and then in some favourable place insert their sucking tube, or proboscis, into the bark, leaf, or fruit and remain stationary henceforth. There is only one generation in a year.

Many kinds of trees and shrubs are attacked by the scale, but the most common are the apple, pear, quince, currant, gooseberry, mountain ash, white ash, hawthorn and horse chestnut.

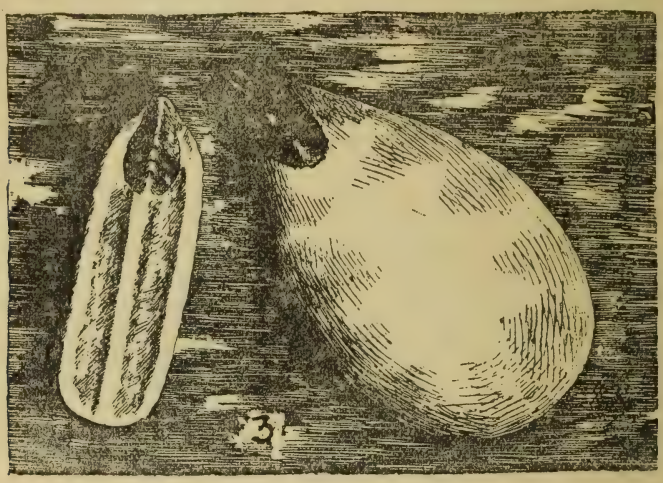

FIG. 26. Scurfy Bark-louse (*Chionaspis furfura*). Adult male and female.

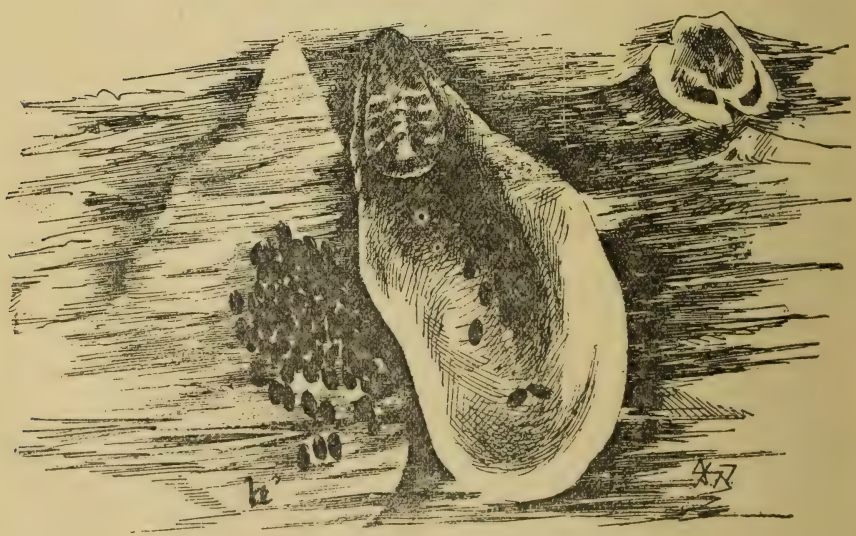

FIG. 27. Scurfy Bark-louse (*Chionaspis furfura*). Adult female, under surface, showing the insect at anterior end, and the numerous purplish eggs.

Remedies.—The same remedies should be used as for the Oyster-shell scale.

Parasites.—The parasites are largely the same as those that attack the Oyster-shell. The most common are (1) the mite, *Tyroglyphus malus* (Schimer); (2) a small chalcid, *Ablerus clisiocampæ*, Ashm; (3) the twice-stabbed lady beetle, *Chilocorus bivulnerus*, Muls.

The Rose Scale, *Aulacaspis rosæ*, (Bouche).

Here and there all over the province we find the Rose Scale attacking rose bushes, and blackberry and raspberry canes. The plants attacked are nearly always in damp, shady places, such as overcrowded gardens, and it is seldom that we find the scale out in open, airy plots.

The mature female scale is nearly circular in shape, moderately convex, 2-2.5 mm. in diameter, almost snow-white, except for a brownish yellow spot, the exuviæ, situated towards one side and extending nearly to the centre.

The male scale is also white, but is very different in shape and size. It is elongate, about 1 mm. in length, 3 mm. in width, and has three parallel ridges running longitudinally along the upper surface.

The scale may pass the winter in almost any stage, from the egg to the mature insect. Breeding goes on almost continuously from the warm days of spring to the severe frosts of late autumn.

Remedies.—From the tendency of this scale to occur almost solely on damp, much shaded plants, the most rational method of treating it is to prune out the bushes so as to let plenty of air and sunlight get access to them. In this pruning, of course care should be taken to cut out the worst infested parts. In special cases, it may be necessary to resort to lime-sulphur, kerosene emulsion, or whale-oil soap, to be applied when the plants are dormant. Invigorating the plant by fertilizers is also helpful.

The Pine-leaf Scale, *Chionaspis pinifoliæ*, (Fitch).

The Pine-leaf scale is very common in many parts of Ontario, and is probably found all over the province. It has not, however, so far as we know, caused any perceptible injury to the trees, although reports from New York state go to show that wherever it is very abundant on a tree it does much damage.

The scale is easily identified from its shape, size, color, and the fact that it is only found on coniferous trees. The female scale resembles to a large degree the Oyster-shell scale in size and shape, but unlike it is seldom curved and is almost entirely snow-white, except for the exuviæ, which are dull colored. The scales are not always of the same shape, some being longer and narrower in proportion to their length than others. This, in many cases, seems to be due to the shape and size of the needles they are situated on. The average length is 2.5-3.5 mm. and the average width .75-1.3 mm. The scale is more convex than the Scurfy Scale and is a little thicker in texture, though not nearly so thick and firm as the Oyster-shell scale.

The male scale very closely resembles the male Scurfy scale, and like it is less than one-third the size of the female scale. It is elongate, about 1 mm. long, 3 mm. wide, snow-white in color and has three parallel ribs or ridges running longitudinally along the upper surface.

The winter is passed in the egg stage. From 20-70 purplish eggs are to be found beneath a single scale cover. The eggs usually begin to hatch about the end of May, but this season were about three weeks later. There are said to be two broods each year, the females of the last brood laying their eggs late in the autumn.

The scale, as mentioned above, confines its attack solely to conifers. We have found it at Guelph on the following pines: White, Bull, Austrian,

Scotch, Jack, and Dwarf Mugho, and also on the Norway and White Spruce.

Remedies.—As a rule, there is no need of resorting to any remedy to control this scale as it is seldom sufficiently abundant to do much damage. If, however, it should be found in such numbers as to injure perceptibly trees in a lawn, kerosene emulsion can be used, but this would be impracticable, of course, in any place where there were a very large number of trees to treat.

Parasites.—About one-third of the scales examined this year were found to have been parasitised, apparently by a Chalcid fly. A species of mite was also found preying upon them. Thus it is probable that we owe much of our security against the rapid increase of this insect to these parasites.

THE LIME-SULPHUR WASH.

By L. Caesar, Ontario Agricultural College, Guelph.

From time to time during the last two years questions have arisen in connection with the lime-sulphur wash which have made the Entomological department feel that there was need of a further study of this important mixture in order that they might be able to give fuller and more definite information to fruit-growers. Accordingly Dr. Bethune and Mr. Jarvis, not having an opportunity themselves to devote their attention to this subject on account of the mass of other work to which they have to give their time and energy, asked me to begin the investigation this year.

After reading the best literature I could find on the subject and getting valuable suggestions in this way, I began to make the mixture on a small scale in the chemical laboratory, where I could use glass vessels and see the different phases passed through, so far as there was any physical evidence of these. It was my intention at first to attempt to study the chemistry of the wash, but I soon found that this would make a whole season's work and that in any case the field experiments were necessary first to show what chemical problems there were. This autumn Professor Harcourt of the Chemical department informed me that his department intended, if possible, this winter to study the chemical side of the wash. He asked me to let him have a list of any chemical problems that had occurred to me in connection with my work on it during the season.

After some laboratory experiments I began my field experiments. Any experiments, however, made at Guelph alone would be inadequate, because we have no San José scale here, and because we are also free from a number of plant diseases that are very troublesome in the more truly fruit-growing districts of the province. Hence, I determined to make a trip to the Niagara district in the spring when the wash was being applied to the trees, and again in the fall to see the results, and to interview the best fruit-growers to find out their experience with the wash. I tried, moreover, whereever possible, to supplement my own experiments by visiting particular orchards in other districts or communicating with men who were using the spray. In these ways considerable information about the wash has been obtained, although I am aware that it will require further experiments for two or three years longer before we shall know all that we should about this mixture.

I shall not attempt to give any account of the details of the experiments made, but rather will discuss the different points of interest in succession. Before proceeding to deal with these points, I should say that it was not

merely a few trees that were sprayed with the mixture at Guelph; almost 600 gallons of the spray were put on. Each tree was carefully done but was only sprayed once.

What Formula Shall We Use?

One of the first points of interest is to determine what formula is most satisfactory. While this is an important matter, yet there is room for a considerable amount of freedom. In countries like California and some other American States where there is very little rain, a weaker mixture than will suit our conditions may be used with good results. I found that the chief objection to using a formula as weak as 15 lbs. lime, 12 lbs. sulphur and 40 gallons water was that the spray was washed off the twigs too quickly by the spring rains. It is very important, however, that the spray should remain on all parts of the tree as long as possible. The lowest formula that seemed to me satisfactory, from my own experiments and those I observed elsewhere, was 20 lbs. lime, 15 lbs. sulphur and 40 gals. water. This formula has given excellent results. For instance, Mr. W. H. Bunting, of St. Catharines, one of the most successful fruit-growers, has used it for some years, and though the San José scale has been in his orchards for a long time and is very bad in neighboring orchards, he keeps it under complete control with lime-sulphur of the above strength. Many farmers, however, prefer to use a slightly stronger wash. The majority of those I met in the St. Catharines district used 22 lbs. lime, 18 lbs. sulphur and 40 gals. water. This is also about the average strength used at Grimsby, Winona and Fruitland. There is no trouble whatever in spraying a mixture as strong as this or even stronger, as I myself proved. New nozzles of the type of the "Friend" allow such mixtures to be put on in a fine mist without any trouble from clogging. There can be no objection then to a fruit-grower using a mixture of this strength or even stronger except that where spraying is done every year 20 lbs. lime, 15 lbs. sulphur and 40 gals. water give practically as good results and the expense is considerably less.

First Steps in Boiling.

Having decided then that 20 lbs. lime, 15 lbs. sulphur and 40 gals. water shall be the minimum strength, let us next consider the best way to go about making the wash. After testing several ways, I found none more satisfactory than the following: put about 13 gals. (about one-third of the total 40 gals.) of boiling water into the barrel. Turn off the steam and at once put the 20 lbs. of lime into the water. (Care must be taken to use only fresh unslaked lime). When the lime has begun to slake vigorously add the sulphur, which should have been made into a thick paste with boiling water before the lime was added. The whole should now be stirred as well as the boiling will permit. When the boiling begins to slacken, turn the steam on again. Stirring should be repeated every five minutes or so in order that any little lumps of sulphur may be more readily broken up and go into combination. Boiling must always be vigorous, so vigorous as to keep the contents of the barrel in constant commotion and cause the liquid to splash up to the top.

How Long to Boil.

One set of experimenters used to say that boiling should be continued until the deep green color came, others said to boil until the orange or amber shade was reached. When Prof. Harcourt and I visited the St. Catha-

rines district last spring and saw the dirty, dark green color characteristic of most of the spray that was being used, we both remarked that we could not possibly get such a color with our Guelph lime. On our return I procured, with Prof. Harcourt's assistance, a bushel of lime from Port Colborne and another from Beachville. Laboratory tests were made with each of these, and with Guelph and Caledon limes, to see what color of wash would be obtained from each kind. The results were interesting. Port Colborne lime gave a dirty dark green, Beachville a greenish orange or greenish yellow, Guelph was slightly lighter in shade, Caledon gave a green but one considerably lighter than that from Port Colborne lime. Each kind of lime was boiled for one hour under as nearly as possible exactly similar conditions. The formula used was 22 lbs. lime, 18 lbs. sulphur and 40 gals. water. Hence it is quite clear that the color obtained depends solely upon the kind of lime used. For general directions, therefore, it is not possible to say what color must be reached. The best way is to boil *vigorously* for one hour. By the end of this time all the sulphur will have entered into combination with the lime and further boiling will not make the wash more effective. It should be remembered that if the barrel is nearly full or even half full of water, it will not boil quite so rapidly as if there were only about 13 or 14 gals. of water in it.

Is it Necessary to Use any Special Kind of Lime?

Whether the lime of one's own district will give satisfactory results or not is an important question. There is very little doubt that the lime with a high percentage of calcium in it is more desirable than a lime like that of Guelph, containing nearly 40 per cent. of magnesium.

This element will not unite chemically, to any extent at least, with sulphur, and hence to some degree weakens the wash. However, I have found that even Guelph lime will give good results though not quite so good as Port Colborne or Beachville lime. Of these latter two, Port Colborne was the more convenient to use, because the wash made from it stands up better than any other I have experimented with, and so requires less agitation in the field. If any one is in doubt about the spraying value of his lime, he could easily have it tested by forwarding a sample to the Chemical department, but there is little question that good results will be obtained from almost any kind of lime. It is always easy to send for a bushel of some known lime like Port Colborne and compare results with those from the home lime.

The Dilution of the Mixture.

Many farmers dilute with cold water, but it is more desirable that hot or warm water be used so that the spray will be put on fairly hot. There are several reasons for this: (1) It is easier to spray with a warm than a cold mixture because the nozzle is less likely to clog. (2) The spray penetrates crevices and covers the bark better if put on hot. (3) If the mixture is allowed to cool there is a danger of certain substances crystallizing out in the form of tiny orange needles. This fact suggests that, if for any reason the mixture is left over night, it will be necessary to reboil it for a short time to bring these crystals into solution again. A convenient method that I have used is to dilute with cold water and then turn on the steam for a few minutes to heat the barrel up a few degrees before transferring the mixture to the spray tank.

Devices for Boiling.

Much the handiest and cheapest method of boiling is that a number of farmers should club together and hire a man to boil for them with a steam-engine. An ordinary threshing engine is generally used. An engine of this sort can be so adjusted as to boil from eight to ten barrels at once. A number of farmers have small upright steam generators, each of which costs about $125. This is a very satisfactory method of boiling. Many farmers, however, are doing excellent work with ordinary large iron kettles, each holding about 20 to 25 gallons. These are either placed in a brick arch or are enclosed by sheet iron so as to concentrate the heat and prevent the wind from blowing the flames in every direction. One enterprising young Englishman had no engine or kettle, so he made a tight-fitting box of planks about 6 x 4 x 1½ ft. in size and covered the bottom and sides of this with sheet-iron to prevent the wood from catching fire. A small foundation about a foot high was built for the box to rest upon. An opening was left in the front of this to throw fuel in and a stove pipe arranged at the other end to draw off the smoke and create a draft. Upon the box a cover was placed of boards nailed together but with an opening along the centre to work a hoe in to stir the liquid. This simple device worked splendidly and good mixtures were made by it.

It is perhaps unnecessary to say that very few of the fruit-growers are to-day using the self-boiled method of preparing the wash. It has not given nearly so good satisfaction as the other method.

Things to Observe in Spraying.

One often hears a great deal about the unpleasantness that accompanies the use of lime-sulphur. Much of this objection can be removed by attending to the following points: (1) Every precaution should be taken to choose as convenient a place as possible for making and loading the spray. This place should not be allowed to become muddy. The use of a few boards and the digging of a little drain if necessary can usually remedy this defect. (2) Spraying should be done only with and never against the wind. (3) Long hose should be used so that the driver and horse need not be brought close to the tree, and so may escape getting covered with the spray. (4) Workmen should be provided with suitable gloves to protect their hands. (5) A nozzle that will not easily clog, such as the "Friend" or "Simplex" should be used. Of course the spray should be carefully strained before it enters the tank.

To give satisfactory results good, careful spraying must be done. A day or two after an orchard has been sprayed, the spray-wagon should be taken over it again and any twigs or branches that have been missed can then be clearly seen and sprayed. Unless every part of the tree is drenched, the best results cannot be obtained. Some fruit-growers take so much care to see that every tree is thoroughly done that they even go through the orchard a third time to touch up any poorly sprayed places.

The Best Time to Spray.

I have not yet had a chance to test the merits of fall spraying. It is well known that it does not meet with so much favor as spring spraying. There is no doubt, however, that if a man knows that for some special reason he is likely to be unable to spray in the spring, he should by all means do so in the autumn as soon as the leaves fall. Of the spraying that is done

in the spring my experience leads me to give a decided preference to that which has been put on when the buds were actually bursting, compared with what was sprayed a month earlier. I find that the longer the wash remains on the trees the better the results. Now a spray put on a month before the leaves come out will wash off much more rapidly than that put on when the buds are opening, for the simple reason that, in the latter case, the leaves coming out soon after, break the violence of the rain and to a very considerable extent protect the spray. Many other experimenters have found the same result. In Bulletin No. 107 of the year 1906, Prof. Forbes, of Illinois, says, that January applications were only about half as efficient as those made in March. Allowing for difference of climate this would be practically the same thing here as spraying in March compared with the end of April. I found that trees sprayed for Oyster-shell scale on March 9th seemed to be but little benefited, whereas a very large per cent. of the scale was killed on those sprayed on May 10th, that is two months later. In every case where I examined trees for either Oyster-shell or San José scale I found that those on which the wash had remained longest showed much the best results; and, other things being equal, these were always the last sprayed trees.

But some one may ask, "How late is it safe to spray?" Personally I think it is perfectly safe to spray until the buds are nearly open. I sprayed a few currant bushes when the leaves were nearly an inch wide, and there were scarcely any signs of injury to the foliage. Apple and plum branches were also sprayed when the buds were almost open; a very slight sign of their having been burned in some cases around the edge was all the injury I could detect. I have seen a number of plum trees sprayed when the buds had practically burst and yet no injury resulted. In the Niagara district I made a number of inquiries on this point and in every case got the answer that it was quite safe to spray even while the buds were actually bursting. Peach trees, having a very tender foliage, should not be sprayed quite so late as more hardy trees. I found that a number of the farmers next year think of spraying, as an experiment, a few trees just after the blossoms have fallen. Their object is to see the effect upon aphids, plum rot, and apple and pear scab. Mr. J. W. Smith told me of an interesting experiment that had been performed by his tenant, Mr. R. Doughbrough, on Mr. Smith's farm at Vineland. I called on Mr. Doughbrough and asked him for further information. He said he had sprayed some pear and plum trees this spring just after the blossoms had fallen. He used the full strength 22 lbs. lime, 16 lbs. sulphur and 40 gals. water, boiled for 45 to 60 minutes.

The foliage, he claimed, was practically uninjured and was equally as good as that on trees sprayed earlier in the spring. The results upon the scab will be referred to later. Though Mr. Doughbrough was able to spray so late this year without injury, it is very probable that a difference of weather would have caused the spray to burn the foliage severely. Therefore, while it is advisable to spray as late as is safe, all spraying should cease before the blossoms come out. In any case the blossoms and leaves would prevent the spray from covering the bark of the tree thoroughly and so scale or other hibernating insects could not be so effectively controlled.

The Effect of Rain.

The question has sometimes been asked whether, if rain comes after spraying, it will be necessary to spray again. The best answer to this ques-

tion is that those who have any doubts about the rain having injured the spray should examine the trees a day or two later and see whether it has been washed off. If it has, the bare twigs or branches should be given another coat of the mixture. I sprayed a few trees purposely during a moderately heavy shower to see the effect. A day or two afterwards I examined them and found, as I expected, that there was very little of the spray on them. Some other trees, however, had been sprayed an hour before the shower began and had had time to become dry; these were not visibly affected by the rain and sleet. It stands to reason, moreover, that one should not spray immediately after a shower but should wait until the trees are dry. Before leaving this subject it is perhaps well to remove the misconception that at least some mixtures of lime-sulphur, once they have become thoroughly dry, are scarcely at all affected by rain. On one occasion this spring I investigated this point during a fairly heavy rain. Some of the trees had been sprayed with Port Colborne lime, others with Beachville, others with Guelph. In some cases the wash had been boiled 45 minutes, in others 60, in others 90, and in others as long as 3 hours. In every one of these cases lime was quite visible in the large drops on the underside of the twigs and branches. So that the length of time the wash remains on (one season compared with another) depends to a large extent upon the amount of rain that has fallen. In a very wet spring it is quite probable, therefore, that the efficiency of the lime-sulphur, while not entirely destroyed, would be greatly lessened.

How the Spray Kills.

It is very difficult to say just how the spray kills. Chemists have found that as a result of the chemical reactions that are constantly taking place on the tree, minute particles of sulphur are being constantly set free. Sulphur is known to be not only a good fungicide, but also an insecticide and it is possible that many of the insects like the San José scale, which have a thick covering to protect them, are killed by inhaling the sulphur which would naturally permeate everywhere, even beneath the scale. At any rate sprayed branches examined by me this year showed that by June 8th the San José scale insects were nearly all dead beneath their covering. In many cases the direct caustic nature of the wash seems to be the cause of death, e.g., of freshly hatched aphids. In others, such as the Oyster-shell scale, the wash seems to harden around the scale and prevent the young from hatching or from emerging after hatching. Under the same scale coverings of this insect I have found some of the eggs unhatched and others hatched but the young larvæ lying dead as if unable to escape. Of course it is very probable that some sort of caustic action also helps in destroying this scale. I have noticed that the scales are nearly always more brittle and so more easily removed on the sprayed trees than on the unsprayed; so that the eggs may to some extent be exposed to the weather and thereby destroyed. The same thing may hold true of the San José scale insects. I have not found, however, that a very large percentage of deaths is due to the scales being loosened and falling from the trees. Not more than three per cent., I think, of the Oyster-shell scale were destroyed in this manner. Later on in the season, however, the old dead scales on the sprayed trees began to peel off and leave the bark fresh and clean. Probably one of the most effective ways in which the wash acts as an insecticide is in keeping the bark covered and either making it difficult for the young scale insects to find a suitable and attractive place to settle down and insert their sucking tubes, or else making it impossible for them to insert them at all.

The fungicidal value of the wash is probably due, first to the sulphur and certain sulphur compounds which are well known to have a fungicidal value, and secondly to the covering left on the tree acting as a means of preventing spores from finding so favorable a lodging place as they otherwise would. The spray that falls on the dead leaves on the ground beneath the tree must do much to destroy spores that are hibernating there. We cannot, however, say definitely just how the wash gets its full insecticidal and fungicidal value.

Kinds of Trees and Shrubs that May be Sprayed.

Many fruit-growers are using this wash now on every kind of fruit-tree and shrub, even on raspberry bushes. A few are using it on grape-vines but this is unusual. It has no known injurious effect upon any of these plants.

Results Upon Insects and Fungus Diseases.

In discussing the results of the spray, I shall take up its effect upon insects first and then upon fungus diseases and upon the general health of the tree.

The San José Scale.

It seems hardly necessary to discuss the effectiveness of the lime-sulphur wash against the San José scale. There is none of this scale at Guelph, hence I had to rely upon my own observations elsewhere and upon the testimony of reliable fruit-growers for my information, on this point. I shall mention a few cases simply by way of illustrating that the wash will most effectively control this terrible pest. In the St. Catharines district the fruit-growers who have carefully and systematically sprayed their trees with this wash are not at all afraid of the San José scale, whereas those who never spray or carelessly spray are rapidly losing their trees by its ravages. Such men as the latter class explain the success of their neighbors on the ground that Heaven is kind to some people while others never have any luck. But let us take the case of Mr. Bunting, president of the Fruit-growers' Association of the St. Catharines district. On one part of his farm there were four or five rows of pear trees that had been sprayed with Scalecide at the strength of one part to fifteen of water. Nearby in the same orchard were several acres of peach trees that had been sprayed with lime-sulphur. As I walked along between the rows of pear trees and looked at the fruit on the ground, I saw that nearly every pear showed numerous red spots, which said more plainly than words that they were badly attacked by the San José scale. In the peach orchard, however, I sought in vain for some time to find a single scale. Mr. Bunting said there were some left but so very few that one often had to look a long time to find any. Another example of the effect of the wash was seen at Mr. Doughbrough's farm at Vineland. On this farm the lime-sulphur had scarcely been used at all until this year. The rapid increase of the scale, however, caused Mr. Doughbrough to try the wash this season on all infested trees. Last autumn several trees were so badly weakened by the scale that it was thought they would die. It was decided not to cut these down this spring but to keep them as a special test of the merits of the wash. Accordingly each tree was very carefully sprayed. The results surpassed the hopes of Mr. Doughbrough. On all the trees but one there was hardly a scale left and this one had fewer than the previous year. Furthermore the foliage was vigorous and the trees bore almost an average crop of fruit. It is unnecessary, however, to mention other ex-

amples that could easily be given from any farmer who has carefully used this wash against the scale. The fact is that wherever a man says he has not got good results against the San José scale from the use of lime-sulphur, it will turn out on close investigation to have been due to some fault in preparation or manner of application. The wash is at present the cheapest and most effective remedy for the San José scale in Ontario.

The Oyster-Shell Scale.

If we take Ontario as a whole we shall probably find that more injury is being done at present to fruit-growing by the Oyster-shell scale than by the San José, simply because the former is abundant in almost every orchard while the latter is limited to only a few districts. Consequently a good remedy against the Oyster-shell scale would be a great boon to the province. Whether one year's experiments are enough to decide this question is a matter of some doubt. I have endeavoured to make my experiments sufficiently extended to draw accurate conclusions. I have also visited several apple orchards in different parts of the province to compare results. It has been more difficult, however, to determine the effect of the wash definitely than one would have thought. The reason for this is, that owing to the cold, backward spring and the unfavorable weather which followed soon after the hatching of the eggs a very large proportion of the young scales, even on unsprayed trees, died before reaching maturity. When there were so many dead scales it naturally required much more careful work to determine accurately the effects of the wash. I found that on the trees that were sprayed before the middle of April almost all the eggs hatched out; on those sprayed about the middle of April much fewer, and on those sprayed in May when the buds were bursting, only a small percentage hatched. In other words wherever the wash remained well on the tree and covered it, there were very few eggs hatched compared with the cases where it washed off before the hatching season. Not all the eggs, however, on any tree were killed. I found practically the same results in other orchards. But some farmers, whose orchards I had not a chance to visit, reported that the wash had been useless. I think the majority of fruit-growers who have tried lime-sulphur only once or twice for the Oyster-shell scale have not been satisfied with the results. I believe the reason for this is largely that they sprayed too early in the spring and did not cover the trees so thoroughly as they should; in short they did not drench the trees from top to bottom. Had these points been attended to they would have killed a large percentage of the scale, though not all in one season. I have observed that where orchards are sprayed every spring for a number of years in succession there are practically no Oyster-shell scales left. But it is not enough to examine the trees soon after the eggs have hatched; they should also be examined later in the season to see what proportion of the young larvæ has matured. I find that on the trees that showed the most successful results in July, it is difficult to discover a single living scale this autumn. Yet one should not draw inferences rashly from this condition of affairs; for as I have mentioned above a very large percentage, apparently as high as 75 per cent. of the young scales died even on the unsprayed trees here this year. If then we are to judge by the earlier results we can only say that lime-sulphur is not a perfect remedy for Oyster-shell scale if it is only to be applied once; but that if it is put on late in spring and repeated for several years in succession it gives excellent results. For a single application I believe kerosene emulsion or flour-kerosene put on when the eggs have just

hatched gives better results. Whitewash applied twice in the autumn after the leaves have fallen is said to be an excellent and cheap remedy.

The New York Plum Scale.

All the scales of this species which were covered with the spray were killed and shrivelled up. As these insects hibernate chiefly on the underside of branches and twigs and are sometimes found in great abundance on this part of the lowest branches, great care should be taken to see that the spray is forced up through the tree from beneath as well as driven in from the side or allowed to fall upon the branches from above.

The Pear-tree Psylla.

I asked the opinion of those farmers who have tested the effect of this wash upon the Pear-tree Psylla. The most definite information I got on the subject was from Mr. E. M. Smith, of Winona. Mr. Smith was one of the first men in the district to begin using lime-sulphur. It occurred to him one year that the wash might destroy the Psylla, so he made a special test. A certain plot of pear trees were sprayed with lime-sulphur, and another plot equally bad with the Psylla was left unsprayed. The result was such as to convince him most strongly that the wash would destroy this insect.

Aphids.

Whether the lime-sulphur will destroy aphids' eggs and thus control the aphid pest is a much disputed question. Some of the fruit-growers think it will, others think not, but none whom I met could give definite information. In some of my own experiments this year the aphids had already hatched and were on the ends of the opening buds; some also had worked their way in among the tiny bud leaflets. About 50 per cent., as nearly as I could tell, were destroyed by the wash. Only those died that the spray had actually fallen upon. Those that were in among the leaflets of the bud were of course safe, and in spite of the most careful spraying some of the others failed to be hit. On trees that had been sprayed before the hatching of the eggs, I found it impossible to determine the effect on the eggs simply because there were scarcely any eggs to be found. In order to test this point better, a tree with numerous eggs on the twigs was sprayed this autumn on November 23rd, but it is not possible to determine the results in time for this paper. A number of good entomologists tell us that the wash does destroy the aphid eggs. Every one should test this for himself, and if it prove to be true in our climate as well as in the United States, it will be another strong argument in favor of using lime-sulphur.

The Bud Moth.

The part of the orchard which I sprayed in May was the part where the Bud Moths were worst. So far as I could see from comparing sprayed and unsprayed trees very few of these insects were killed. It is probable that all the larvæ were already out of their winter cases and were in the bursting buds and so escaped the spray. There is need of further experiments to determine the effect upon this pest.

The Codling Worm.

As a result of spraying with Paris green there are very few Codling worms in the College orchard; hence I could not determine the effect of the

wash upon them. It is difficult to see how these insects could be injured by the spray, yet some American Experimenters state that the wash does a good deal to control the Codling worm. The only case that I know of which would tend to show that the wash may greatly lessen the number of codling worms was at Fruitland in one of Mr. Tweddle's orchards. For some cause Mr. Tweddle sprayed about an acre of apple trees at one end of the orchard and situated just at the base of the mountain; the rest of the orchard was not sprayed with lime-sulphur, although both parts were sprayed with poisoned Bordeaux mixture later in the season. When I went through the orchard in September there were scarcely more than half as many wormy apples in the sprayed as in the unsprayed part. Mr. Tweddle attributes this result to the lime-sulphur. Possibly this was the case, but it would be necessary to make sure first that the later spraying with poisoned Bordeaux mixture had not been put on at exactly the proper time in this part and a little too late in the rest. Mr. Tweddle intends to make further experiments on this point next year. It is certain, however, that whatever benefit in this respect may be obtained, the wash will not completely control the codling worm; for in several orchards where it was used there was a very large proportion, about 50 per cent., of wormy apples.

Peach Leaf-Curl.

The evidence in proof of the lime-sulphur as a reliable preventive of Peach Leaf-curl is practically overwhelming. If any one has any doubt on the matter I refer him to such well known fruit-growers as Messrs. J. W. Smith, of Winona, Robert Thompson and W. H. Bunting, of St. Catharines. These and many other successful fruit-growers can, from their own experience, convince any man who is willing to be convinced.

Gooseberry Mildew.

It is well known that the chief difficulty in growing English gooseberries in America is that they are very subject to attacks of mildew, which practically destroys the leaves and fruit. Three years ago, almost by accident, Mr. Joseph Tweddle, of Fruitland, sprayed his English gooseberry bushes with lime-sulphur and was pleasantly surprised to find them comparatively free from mildew that season. Next year, and again this year, he has used the same wash with the same good results. This year Mr. E. D. Smith, of Winona, tried lime-sulphur on his bushes and agrees with Mr. Tweddle in saying that so far as their experience has gone the lime-sulphur makes the growing of this class of gooseberries both possible and profitable. Other fruit-growers in the Niagara district who have heard of these results told me they intended trying the experiment next year. Should these experiments turn out in the way it is expected no small benefit will accrue to the fruit-growers of the province.

Plum Rot.

Very few plums rotted this year, hence the effect of the lime-sulphur upon plum rot cannot to any appreciable extent be determined by this year's experiments. The general consensus of opinion, however, among those who have used the wash on their plum trees for several years, is that it has considerably lessened but not entirely prevented the disease.

Pear Scab.

An interesting experiment to determine the effect of lime-sulphur upon the Pear Scab, when applied much later than usual in the spring, was made by Mr. Doughbrough, of Vineland. Mr. Doughbrough, as I have mentioned above, sprayed some pear trees with lime-sulphur after the blossoms had fallen. These trees had been badly affected with Pear Scab the previous year. Some nearby trees were left unsprayed. The result was that the fruit on the sprayed trees was very much cleaner than on the unsprayed. He said that one could tell by a glance at the gathered fruit which belonged to the sprayed trees, and which to the unsprayed. I have not had an opportunity of finding the effect upon the disease of spraying at the usual date.

I have not been able in this one season to deal with all the problems that have suggested themselves to me in my study of this very useful spray. There are many fungus diseases yet upon which I have either no information or none that is valuable; for instance, apple scab, shot-hole fungus, and powdery mildew of cherry. Moreover the effect upon many insects and insect eggs has not been dealt with. No one orchard, probably no one district, affords an opportunity to make experiments upon all of the fungus diseases and insect pests which are to be found in this province. To get as full information as is desirable experiments must be carried on for several years and by several persons in different localities. The first year's work, though quite valuable in direct results, is perhaps even more valuable in showing what problems should be investigated and how to go about their investigation.

In conclusion there are a few points that should be mentioned: (1) It is clear that the trees treated with lime and sulphur ought to show a more thrifty appearance as a result. This was very conspicuous in many orchards and my attention was frequently directed to it by the fruit-growers. (2) No person should think that because lime-sulphur is such an excellent wash he need use no other spray. It must not be forgotten that lime-sulphur is only meant for a spring or fall wash and there are many fungus diseases and insects that can only be controlled by the use of a summer wash in addition. Poisoned Bordeaux mixture is, therefore, necessary to supplement lime-sulphur. In the careful use of these two spray mixtures lies the secret of much of the success of our best fruit-growers.

AN UNUSUAL OUTBREAK OF HALISIDOTA CATERPILLARS.

By Arthur Gibson, Assistant Entomologist, Experimental Farm, Ottawa.

One of the interesting outbreaks of the season of 1907, has been the unusual number of the caterpillars of two Halisidota Tussock Moths, viz., the Hickory Halisidota, *Halisidota caryæ*, Harr., and the Spotted Halisidota, *Halisidota maculata*, Harr. We have no record of these insects being so abundant and destructive in Canada, as they were during the past season. In the United States, the Hickory Halisidota Tussock Moth has, on several occasions, being recorded as doing much damage in limited localities. During the present year the Hickory Halisidota while numerous and injurious in Ontario and Quebec, was particularly destructive in the Maritime Provinces. The Spotted Halisidota, on the other hand, while also troublesome to some extent in Ontario and Quebec, was specially reported as doing harm in Mani-

toba and Saskatchewan. In the Ottawa district, both of these caterpillars were decidedly more in evidence than is usual and their work could readily be seen, chiefly on elm and basswood trees.

Many specimens and reports of injury by these insects have been sent in. The following extracts from some of the letters received at the Division of Entomology, will give an idea of the extent of the infestations.

THE HICKORY HALISIDOTA TUSSOCK MOTH.

Weymouth, N.S., August 15. "The caterpillars which I sent you on the 7th inst., and which you identified as those of the Hickory Tussock Moth, are very numerous on alder trees. To-day I noticed several trees which were covered from top to bottom with these caterpillars. I also found them on an apple tree, hundreds on a leaf." M. G. DeWolfe.

North Range, N.S., August 16. "I send you some caterpillars which are attacking the beech trees here. They move about from one limb to another. I am also told that they are on the apple trees near by, as well as on the beeches." F. V. McNeill.

Smith's Cove, N.S., August 15. "I am sending you some caterpillars. Please tell me what they are as they are eating the trees very badly. They are mostly on hardwood trees, birch and beech, but apple trees are also being injured." G. W. Potter.

Bear River, N.S., August 21. "Am sending you a small box containing samples of caterpillars that are numerous in some sections of Digby County. Please tell me what they are and give me a remedy for them." B. C. Clarke.

THE SPOTTED HALISIDOTA TUSSOCK MOTH.

Lancaster, Ont., August 28. "I found a large number of caterpillars, such as the one I am sending, on apple trees." A. G. McBean.

Brome Centre, Que., August 31. "I am sending a species of caterpillar which has been very numerous and very destructive here." H. H. Millar.

Brandon, Man., Sept. 13. "I am sending you some specimens of a caterpillar which I found quite common in many tree plantations during the past two weeks or more. This caterpillar is found most frequently on the Manitoba maples. I have also found it on Russian poplars, and some of the bush fruits, such as gooseberries and currants, are infested to quite an extent." F. W. H. Jacombe, Inspector of Tree Plantations, Dominion Forestry Branch.

Yellow Grass, Sask., Sept. 13. "The caterpillars which I send have been doing considerable harm by eating the leaves of ash-leaved maples." J. J. Odell.

Barronsfield, N.S., Sept. 16. "I send a caterpillar which seems very destructive. One Manitoba maple tree noticed particularly was completely covered with them." J. H. Seaman.

Mount Hebron, N.B. "I enclose a caterpillar which is abundant on apple trees in this vicinity." H. H. Biggar.

At Rostrevor, on Lake Rosseau, Muskoka, Ont., where I spent the first three weeks in September, the larvæ of the Hickory Halisidota were very abundant. In the rich woods of maple, birch, etc., near by, the caterpillars, which were wandering around in search of winter quarters, could be seen at almost every step. The Spotted Halisidota was also present at Rostrevor, but was not nearly so abundant. Such larvæ of the latter as were seen were all on alder.

From the above quotations, it will be seen that the abundance of these insects in 1907 was much commented upon and caused considerable anxiety. Fortunately, however, these caterpillars appear late in the season and, for

this reason, their injuries were not of such a serious nature as they would have been had the habits of the larvæ been different and the outbreak occurred in June or early in July, when the trees were making most growth.

The caterpillar of the Hickory Halisidota and that of the Spotted Halisidota are very different in appearance. The body of the former is clothed with dense tufts of white hairs, with a ridge of black hairs down the centre of the back, and two pairs of long black pencils on the 1st and 7th abdominal segments, while that of the latter is covered with tufts of bright yellow and black hairs, the black tufts being on the four anterior and three posterior segments and the yellow tufts on the remaining segments. The latter are centered down the middle of the back with a row of black spots. The larva of the Hickory Halisidota is slightly the larger of the two, measuring when full grown about an inch and a half in length.

Both caterpillars are general feeders, being known to attack a great many different kinds of plants. At Ottawa, we have found the larvæ of both species chiefly on elm, basswood, alder, willow, oak and ash. In his "Insects Affecting Park and Woodland Trees," Dr. E. P. Felt says that in New York State the caterpillars of the Hickory Halisidota show a decided preference for walnut, butternut and sumac. The larva of the Spotted Halisidota Tussock Moth is chiefly recorded as an oak-feeding species, in fact it is referred to by some writers as the Oak Tussock Caterpillar. When disturbed, both of these larvæ have the habit of falling to the ground and curling up, in which position they may remain for some little time.

When these two kinds of caterpillars become full grown in autumn, they wander about in search of suitable places to make their winter homes, and when such are found each larva spins an oblong oval cocoon composed of the hairs from its body. The cocoons of both species are of the same size, averaging a little over $\frac{3}{4}$ of an inch in length by about $\frac{1}{2}$ an inch in width. They are different in colour, however, and owing to this can be easily separated. *Halisidota caryæ* has a cocoon of a uniform ashy gray colour, while the cocoon of *Halisidota maculata* is of a decided yellow, from the bright yellow hairs from the larva showing up among the black hairs, also from the

Fig. 28. The Hickory Halisidota Tussock Moth.

Fig. 29. The Spotted Halisidota Tussock Moth.

body of the caterpillar. In some specimens of the latter the yellow is more intense than in others, this of course being caused by more than the usual number of the yellow hairs on the larva. At the present time these cocoons can be readily found in open woods, etc., under pieces of old plank, dry logs, or even stones. On October 8th of the present year, I collected 13 cocoons of the Hickory Halisidota, fastened to the underside of a small piece of board. This was near a large basswood tree on which the larvæ had been feeding. Many other cocoons occurred near by.

Soon after completing its cocoon the caterpillar changes to a reddish-brown pupa, the moths emerging the following June. The Hickory Halisidota Tussock Moth (Fig. 28), measures when the wings are expanded from

1½ to nearly 2 inches. The ground colour of the forewings is ochre-yellow, but is heavily dusted with brown scales. On the forewings are five, more or less, transverse bands, or rows of spots joined together. The outer two rows of these are pearly, the others mostly the ground colour of the wings, edged with brown. The hind wings are paler, semi-transparent, and without any markings. The body is about the same colour as the wings, the shoulder covers of the thorax being margined with brown on the inside. The male differs from the female in being rather smaller and in the antennæ being more pectinate.

The Spotted Halisidota Tussock Moth (Fig. 29), is a more conspicuous looking moth. The forewings are also ochre-yellow, but are spotted with blotches of dark brown, the outer of which forms a distinct band across the wing. The other blotches form four partial transverse bands, the 2nd, 3rd and 4th of which, in most specimens, join in the centre of the wing, forming one large blotch. The hind wings are the same as those of *H. caryæ*. The body is of much the same colour as the forewings, and just behind the collar are two oblique stripes, which converge and almost form a V-shaped mark. In width of wing expanse, this species averages slightly more than the first named species. The same differences occur between the males and females.

As mentioned above, the caterpillars of these two Halisidota Tussock Moths only appear late in the season, but, if another year they should again occur in such numbers on trees of value which it was thought should be protected throughout the whole season, they could, of course, be easily destroyed by spraying the trees with a poisonous arsenical spray, such as Paris green one pound, fresh lime one pound, water 160 gallons. In apple or other orchards which are regularly sprayed with the poisoned Bordeaux mixture, little injury would be done by these and many other kinds of leaf-eating caterpillars.

ADDITIONAL INSECT GALLS OF ONTARIO.

By Tennyson D. Jarvis, Ontario Agricultural College, Guelph.

In last year's Annual Report,* I gave an account of a considerable number of Insect Galls found in Ontario. Further collections and investigations have enabled me to add the following to the list:—

Diptera.

The Iris Leaf Gall. (*Agromyza magnicornis*) (Lowe).

An oval enlargement on the inside of the leaf, usually about 1 in. from the tip. Length ½-¾ in., width ½ in., thickness, ⅓ in. Surface green, like that of the rest of the leaf, except that it is somewhat whitened and withered in appearance. The interior is composed of loose, parenchymatous tissues separated from one another by many air cavities. In the centre is a single chamber about ⅓ in. long and ¼ in. in diameter. Where the gall occurs the leaf broadens, but above the affected part it becomes distorted and dwarfed. Larva, white. Pupa, dark brown. Occurs on the Blue Flag (*Iris versicolor*). Common.

Aspen Egg Gall. (*Agromyza æneiventris*, Fallen). Plate A., fig. 8. This gall resembles in external appearance the Egg Galls of the willow

*Thirty-seventh Annual Report of the Entomological Society of Ontario, 1906, pages 56-72.

and Basswood, but sometimes it more nearly encircles the branch or twig. In form it is irregularly oval, about ⅓ to ½ in. long, ¼ to ⅓ in. wide and ⅛ to ⅓ in. high. The texture is pit-like. The surface, at first smooth and like that of the bark, grows rougher as the gall matures. Polythalamous. The larvæ are greenish, about 3 mm. long and 1 mm. thick. It occurs, usually, singly but often with two united in a straight line, on the terminal branches of the American Aspen (*Populus tremuloides*). Fairly common at Guelph.

The Willow Potato Gall (*Rhabdophaga batatas*, O. S.) Plate A., fig. 7. An oblong ovate gall about 1 in. in length and ⅓ to ½ in. in thickness. The surface is irregular, but for the most part fairly smooth. The color is similar to that of the bark at first, but turns gray when mature. The texture is pith-like, but fairly hard. The gall is polythalamous. The larvæ are small and pinkish. It occurs singly usually, but sometimes with two or more in close proximity on any part of the twigs of the Scrub Willow (*Salix* sp.). Common.

Cock's Comb Hawthorn Gall (*Hormomyia cratægifolia*, Felt). Plate A, fig. 4.

This gall is very similar to the Cock's Comb Gall on the Elm (*Colopha ulmicola*). It is on the upper surface of the leaf and has the appearance of two tiny leaflets about 4-6 mm. high and 8-10 mm. long growing up parallel to each other but at right angles to the surface of the leaf. The upper margin of each is crenate usually, but sometimes the two leaflets coalesce at the top and become thickened in this part. They are green in appearance and of the same texture as the rest of the leaf. On the under surface, there is usually a considerable depression or groove on each side of the base of the gall. Of the infested leaves examined, none had more than two galls to a leaf. Monothalamous; contains a single white larva tinged with yellow. Occurs on the Hawthorn (*Cratægus* sp.). Rather rare.

Elm Leaf-fold Gall. (*Cecidomyia ulmi*, Beuten.) Plate A, fig. 1.

The gall takes the form of a pulpy thickening of the tissues in the under-surface of the leaf, extending for some distance along the midrib. It is usually near the base of the leaf, and causes the upper surface to double on itself instead of expanding in the ordinary way. The enlargement varies in length from about ¼ to1 in. and usually extends about ¼ in. on each side of the midrib. It is about 2 mm. thick. The surface is pubescent like that of the rest of the leaf, but is more or less irregular, with ridges and hollows, often appearing as though two or three galls were joined together. On the upper surface of the leaf the pocket found opposite to the enlargement on the lower surface contains several small white larvæ which have a slight pinkish tinge. The gall occurs on the American Elm (*Ulmus Americana*). Fairly common this year, 1907.

Balsam Fir Needle-Gall. (*Cecidomyia balsamifera*, Lintner). Plate A, fig. 3.

This is an irregularly oblong gall, situated near the base of the needle on the new growth. It encircles the needle, is about 3 mm. long, and from 1 to 2 mm. thick. The surface in most cases is smooth, though often somewhat corrugated, especially on the under surface. The color is a little paler green than that of the needle and the texture somewhat looser and more pulpy. The gall is monothalamous and contains a single orange-colored larva which (August 5th, 1907) had not yet begun to pupate. There is usually only one gall to a needle, but sometimes two continuous ones are found. Occurs on the Balsam Fir, (*Abies balsamea*). Rare.

Dogwood Leaf Gall. (*Lasioptera corni*, Felt.). Plate A, fig. 2.

Thin-walled circular elevations on the under side of the leaves of Cormus. Somewhat bladder-like in appearance, and sometimes occurring in

great numbers. A light-colored areola surrounds the gall which is monothalamous and contains a small larva which moves about quite actively when disturbed. Generally about .5 cm. in diameter. Not commonly distributed but, when found, occurring in great numbers. Late July and August. Found on Cornus sp. Common at Guelph.

Willow Joint Gall. (*Rhabdophaga nodulus*, Walsh). Plate A, fig. 9.

A rather small, irregularly, oval enlargement of the stem at the joints or nodes, about $\frac{1}{3}$ to $\frac{1}{2}$ in. in length and $\frac{1}{4}$ in. in diameter; the texture is woody; the surface smooth and like that of the bark; monothalamous. It occurs on the stem and branches of the Scrub Willow (Salix sp.). Fairly common at Guelph.

Hickory Cone Gall, (*Cecidomyia sanguinolenta*, O.S.).

This is a conical or sometimes almost spherical gall, situated on the under surface of the leaf along the veins. It is much constricted at the point of attachment with the leaf. Height about 4 mm., greatest diameter 3 to 4 mm., surface even, slightly pubescent, color at first red or purplish, later turning brown, monothalamous. The surrounding walls are nearly 1 mm. thick and of close, firm texture when mature. Numerous galls are usually found on a single affected leaf. They occur on the Sweet Hickory (*Carya alba*). Common in some localities.

Hickory Seed Gall, (*Cecidomyia caryæcola*, O. S.).

This is a conical gall with a fine, elongated tip. It is about 5 to 6 mm. in length and 2 to 3 mm. in greatest diameter, is smooth, pale green, turning brown in autumn, monothalamous; the enclosing walls are about .5 mm. thick, close and firm in texture when mature. It is found singly or in large numbers along the veins on the under side of the affected leaves of the Sweet Hickory, (*Carya alba*). Common in some localities.

Grape Vine Tomato-Gall, (*Lasioptera vitis*, O. S.).

"Consists of a bunch of irregular swellings of various rounded shapes. Soft, juicy and succulent. Yellowish green, tinged with red or entirely of this color. On stems and leaf stalks of Wild Grapes. May and June. Common." (Beutenmuller). I have not seen the gall myself, but it is reported from Ottawa by Dr. Fletcher, in the Report of the Entomologist and Botanist for 1887, page 29.

Bunch Gall on Willow. (*Rhabdophaga brassicoides*).

This is a gall of the same type as *Cecidomyia solidaginis*. It consists of a bunch of massed leaves which surround a small cell containing a yellowish larva. Growth having been checked at the end of the stem, this cluster of leaves has been formed. Occurs on Scrub Willow (Salix sp.). Not common.

Goldenrod Terminal Gall (*Asphondylia monacha*, O. S.).

This gall occurs at the tip of the plant and is a leafy conical structure $\frac{1}{2}$ to $1\frac{1}{2}$ in. high and $\frac{1}{2}$ in. in diameter. It consists of many leaflets clustered together and having their basal parts thicker than the part above. This thickened part forms the broad base of the cone, and the thinner part immediately above being incurved completes the conical structure. Above this conical foundation the tip of the leaflets extends to a greater or less degree and forms a sort of rosette. Between the thickened parts of the leaflets live from one to many small yellowish white, or in some stages almost orange, larvæ. The gall occurs on the Goldenrod (*Solidago Canadensis*). Common.

Willow Bud Gall, (*Rhabdophaga triticoides*, Walsh).

This gall seems to be an altered or transformed bud. The bud scales become elongated and the interior becomes a cavity in which the larva lives. The gall is about 5 mm. long, 2 mm. wide, and 1 mm. thick; the side against the stem is flattened. The color and surface are like those of the stem itself. Monothalamous. It occurs on the twigs of the Scrub Willow (*Salix* sp.) and

usually causes the stem to bend at the infested point. Common in some localities near Guelph.

Lunate Marginal Gall. (*Choristoneura flavolunata*, Felt). Plate A, fig. 6.

Circular or somewhat irregularly elliptical spot-like galls only projecting very slightly from each side of the leaf. They are about 1-5—2-5 inch in diameter, the main part of the spot is light colored (usually yellowish), this being enclosed by a dark ring, thus giving it some resemblance to an eye. The galls are glabrous and monothalamous, the larvæ feeding on the internal tissue of the leaf without causing much projection from within. Usually not more than 1 to 2 spots on each leaf. Occurs on *Solidago Canadensis*. Common at Guelph.

Blackberry Leaf Gall, (*Cecidomyia farinosa*, O. S.).

Consists of woody swellings at the base of the leaflets or on the midrib of the blackberry. The larvæ are purplish in color. Rare at Guelph.

Boneset Stem Gall (*Choristoneura perfoliata*, Felt.) Plate A, fig. 5.

Consists of oval swellings of the stems and leaf stalks. When mature, the enlargement is about twice the normal size of the stem. The gall is monothalamous and contains red larvæ. Fairly common at Guelph.

Spiræa Pod Gall (*Cecidomyia salicifoliæ*, O. S.).

The Pod Gall of the Meadow Sweet is found not only on *Spiræa salicifolia* but also on *S. tomentosa* and *S. betulæfolia*. It is quite similar in shape and appearance on all three, and in each it is found on the under surface of the leaf as stated in Entomological Report of 1906, page 68.

Golden-rod Gall (*Trypeta polita*, Loew).

Consists of a bunch of dwarfed leaves caused by the arrest of the growth of the branches. It is a little more than half an inch in length. The larva lives at the base of the gall. Fairly common at Guelph. On Golden-rod (*Solidago Canadensis*).

HYMENOPTERA.

The Large Spiny Rose Gall (*Rhodites multispinosus*, Gill). Plate B, fig. 3.

This gall, when mature, is oblong or sometimes ovate in shape. and is found on the stem and the branches. It averages 1 to 2 in. in length and $\frac{2}{3}$ to 1 in. in thickness in the widest part. The surface is covered with numerous spines or prickles about $\frac{1}{4}$ in. long and is light brown colored. The surface of the gall itself is somewhat rough and irregular, with depressions and elevations sometimes of considerable size. Moreover, after the gall-insects have emerged it is perforated with from 30 to 50 small, circular apertures, each about 1.5 mm. in diameter. The color of the gall is a dull gray. Its texture is firm, hard, brown colored, and granular. The gall is polythalamous, containing from 30 to 50 chambers, each about 3 to 5 mm. long and 2 mm. wide and arranged more or less radially along the longitudinal axis. When mature, the gall-insects make a tunnel from these to the surface. The adult insect is a Cynipid about $\frac{1}{4}$ inch long with reddish colored head, thorax and abdomen. The gall occurs on the Wild Rose. Rare; Niagara District and Toronto.

Cinquefoil Axil Gall (*Diastrophus potentillæ*, Bass). Plate B, fig. 5.

The gall is spherical or oval in shape, from $\frac{1}{4}$ to $\frac{1}{2}$ inch in diameter and about $\frac{1}{2}$ inch long, and is borne on a slightly curved peduncle 3-5 to $\frac{1}{2}$ inch long arising in the axil of the leaves. The gall is spongy in texture, with a solitary central chamber containing the white curved larva which is about 3 mm. in length. The gall is green in summer, reddish brown in winter. Occurs on *Potentilla Canadensis*. Rare in Eastern Ontario.

Blackberry Seed Gall (*Diastrophus cuscutæformis*, O. S.).

Consists of hard, woody, somewhat globular seed-like bodies 2 to 4 mm. in diameter. More or less covered with curved spines which are about 2 mm. long. Yellowish green or olive in color and borne in clusters on the stem, each gall containing one chamber. Rare at Guelph. Occurs on Blackberry (*Rubus villosus*).

Raspberry Stem Gall. (*Diastrophus turgidus*, Bass). Plate B, fig. 2.

A large reddish-brown polythalamous, tubercular or irregular gall, about 1 to 1.75 in. long and .5 in. in average diameter, arising abruptly on the stem. Green in summer, darkening towards winter. Chambers are very numerous, oval in shape, 1.5 to 2 in. in width and 2.3 in. deep. The gall has a number of prickles scattered over it which are about 2 to 3 mm. long, and appear to be enlarged stem prickles.

Oval Willow Stem Gall (*Euura S. nodus*, Walsh).

"A mere general enlargement of a twig from one-quarter more than its normal diameter up to twice its normal diameter, almost always without any abnormal roughness on the external bark, and not always confined to one side only of the twig. General color that of the twig. When cut into (August 28th), the interior of each gall is found to be pithy and to contain 1 to 3 larvæ in separate cells. Frequently on a piece of twig 6 in. long, 2, 3, or 4 of these galls are placed at irregular intervals. No appearance internally of any transverse plates or transverse fibres as in *S. ovum* and *S. ovulum*. Length .75 to 1.50 in., diameter .10 to .25 in. Very like the Cecidomyidous gall, *S. nodulus*, on the same willow (Proc. Am. Ent. Soc., Philada., III, p. 600) but is much larger, is polythalamous instead of monothalamous" (Walsh). The specimens found at Guelph were from .50 to .75 in. in length. The adults of any specimens examined on May 30 had emerged. Occurs on the Scrub Willow (*Salix sp.*). Common in some localities.

Rose Leaf Nipple Gall, (*Rhodites lenticularis*, Bass).

This is a small circular gall of about 3 mm. in diameter. The upper surface is practically on a level with the surface of the leaf and is pale green in color. It is characterized, however, by the presence of a little nipple in the centre, the nipple often being of a purplish shade. The under surface is slightly raised beyond the rest of the leaf and, unlike the upper, is purplish in color and has a slight depression in the centre corresponding to the nipple above. The galls occur singly or, more commonly, in groups, often covering the whole leaf and making its surface uneven. Found on the Rosebush (*Rosa* sp.). Rare.

Oak Wart Gall (*Andricus futilis*, O. S.). Plate B, fig. 4.

This is a rather small, wart-like gall situated in the parenchyma of the leaf and protruding beyond both surfaces, but chiefly beyond the lower. The protuberance on the lower surface is roughly hemispherical in form, averaging 4 mm. in diameter and 2 mm. in height. Its surface is often smooth and even, but quite often it is uneven or pebbly. The color is considerably lighter than the rest of the under surface of the leaf. The protuberance on the upper surface is much the same shape and nature, but is not so high as a rule, being usually only about 1 mm. in height. Its color is also lighter than the color of the surrounding part of the leaf, but darker than that of the under side of the gall. The walls of the gall are thin and much the same texture as the parenchyma of the leaf. The interior contains a kernel composed of two small oblong cells joined together along the side parallel to their longitudinal axis. Each cell has a small cavity within it containing a single, small, white larva. The adult insects emerged about July 30, 1907, and were small, reddish Cynipids. One to several galls may occur on a leaf. They

are found either on Burr or White Oak. (*Quercus macrocarpa* and *Quercus alba*). Common.

Burr Oak Leafy-wreath Gall (*Andricus topiarius*, Ashm). Plate C, fig. 6.

This gall resembles in external appearance the Goldenrod Bunch Gall (*Cecidomyia solidaginis*). It consists of a cluster of dense, narrow leaflets springing from a bud. When mature several small, brownish pupal cases about 3 mm. long and 2 mm. wide can be seen among the leaflets, attached at the base to the woody tissues below. The larvæ are minute and whitish. It occurs on the terminal twigs of the Burr Oak (*Quercus macrocarpa*). Common.

Oak Knot Gall (*Andricus punctatus*, Bass). Plate C, fig. 1.

This is a rough, hard, woody, somewhat globular, knot-like gall encircling the stem and varying greatly in size, but commonly 1 to 2 inches in diameter. The surface is ashy brown in color, and rough, with almost a network of little ridges and depressions. Polythalamous. It occurs on the branches of the Scarlet Oak (*Quercus coccinea*). Common.

Oak Seed-Gall (*Andricus seminator*, Harr.).

This is a woolly gall encircling the stem. It is irregularly oval, $\frac{1}{2}$ to $1\frac{1}{2}$ in. in diameter and $\frac{3}{4}$ to 2 in. in length. Polythalamous, containing many cream-colored cases attached to the twig, each case looking very like an oat seed. Early in the season the gall is white, but later it becomes brown. Occurs on the twigs of the White Oak (*Quercus alba*), Puslinch Lake. Rare.

Pine-cone Oak Gall (*Cynips strobilana*, O. S.). Plate C, fig. 4.

This gall is formed in the axil of a lateral bud just at the base of the terminal bud-cluster. When viewed from some little distance, it appears like a solid globular structure about $\frac{1}{2}$ in. in diameter, but when more closely examined it is found to consist of a rosette, or head of hard, brown, nut-like, wedge-shaped structures fitting closely to one another and attached at the base to a small spherical receptacle about $\frac{1}{4}$ to $\frac{1}{3}$ in. in diameter. Inside of each of these nutlets there is a single chamber, containing but one white larva. Occurs on the terminal twigs of the Burr Oak (*Quercus macrocarpa*). Common at Guelph.

Oak Fig Gall (*Biorhiza forticornis*, Walsh). Plate C, fig. 2.

A group of many small, soft, bladder-like, one-celled structures, each about 1-3 in. in diameter. These are often compared to a bunch or cluster of pressed figs, but seem to me to resemble more nearly the honeycomb of the bumble-bee, except that they are pale yellow in color, sometimes tinged with red, turning yellowish brown in autumn. They are arranged in a cylindrical cluster along the stem of the branches or twigs. The cluster is 1 to 2 in. long and $\frac{1}{2}$ to $\frac{3}{4}$ in. in diameter. The interior of each one of these bladder-like bodies is loosely filled with woolly fibres which keep in its position the small larval cell. Occurs on the twigs of the White Oak (*Quercus alba*). Common in some localities.

Empty Oak Apple (*Amphibolips inanis*, O. S.).

This oak apple gall is very similar in external appearance to *Amphibolips confluentus* (Harr.) but is considerably smaller and is quite dissimilar in its internal structure. It is found on the under side of the leaf, and springs from one of the main veins, is nearly spherical in form, about $\frac{1}{2}$—5-6 in. in diameter, and has a smooth, glossy, light brown surface when mature, which earlier in the season is green. The walls which enclose the almost empty interior are very thin, somewhat parchment-like and brittle. The small spherical larval cell within the cavity is about $\frac{1}{4}$ in. in diameter and

is held in position by a comparatively small number of filaments which radiate from it to the surrounding walls. It occurs on the Red Oak (*Quercus rubra*). Rare.

White Oak Club Gall (*Andricus clavula*, Bass). Plate C, fig. 3.

This is a club-shaped gall situated at the tip of the twigs. It evidently originates in the terminal bud-clusters, which it prevents from developing, though occasionally a few leaves grow out from the gall itself. When mature, it is ½ to 1 in. long, hard and woody in texture, a little darker in color than the rest of the bark, and somewhat grooved and ridged. Very often a second, or even a third, somewhat smaller gall is formed from the lateral buds immediately below. The terminal gall, in the cases examined, was dithalamous, the lateral ones monothalamous. It occurs on the White Oak (*Quercus alba*). Common in Muskoka.

Willow Petiole and Leaf-base Gall (Saw-fly)—*Pontania desmodioides* (Walsh).

This gall has the form of an oblong enlargement of the petiole, or often of the midrib of the leaf near the base. It is 8 to 15 mm. long and 4 to 6 mm. in diameter. Surface smooth and glossy, like that of the leaf; occasionally, however, it is somewhat rugose and irregular. The gall is solid and of a pulpy texture. It was monothalamous on July 8th, the date of discovery, the cavity being very small and containing a tiny greenish-white transparent larva with a brown head. Occurs on the Willow (*Salix lucida*). Rare, at Guelph.

Red Oak Gall (*Andricus papillatus*). Plate C, fig.5.

This gall is red and projects on both sides of the leaf. It is round and about 4 mm. in diameter. Above dark red, below yellowish. About three times the thickness of the leaf. On Red Oak at Puslinch Lake. July.

Spiny Ball Gall on Wild Rose leaf.

The gall described as *Rhodites bicolor* (37th Annual Report, page 70, Plate E, fig. 2), has been identified by Mr. Wm. Beutenmuller as *R. nebulosus*.

Lepidoptera.

Golden Oval Stem Gall (*Eucosma Scudderiana*, Clem.). Plate C, fig. 7.

This gall is situated on the stem and is oval in form, about 1 cm. long and 4 to 5 mm. in diameter. Its surface is similar to that of the stem, but the color is a little darker around the central part. It is pithy in texture and monothalamous. At the date of writing, July 24th, the chamber was small and cylindrical, and contained a single orange-colored larva. The galls are found either singly or often with two united and forming an irregular elongated enlargement. They occur on the Goldenrod (*Solidago* sp.). Common in Muskoka.

Hemiptera.

Plum Gall on Elm (*Pemphigus ulmi-fuscus*). Plate C, fig. 8.

This attractive looking gall occurs on the upper surface of the leaf and resembles in shape an unripe cherry or plum, there being an upper glossy green drupe-like part and a short stem connecting this with the leaf. The drupe-like part is slightly oblong in most cases and varies in length from 8 to 10 mm. and in thickness from 5 to 7 mm. The stem is from 3 to 4 mm. long and 2 to 3 mm. thick. The gall is monothalamous; a rather thin outer covering about 1 mm. thick and somewhat firmer in texture than the leaf encloses a large, round cavity, in which a single mother insect brings forth her brood of many young. The part of the leaf from which the gall springs is drained

of its nourishment and becomes whitish and roughened or blistered on both sides. Occurs singly on the leaf of the English Elm (*Ulmus campestris*). Rare.

NOTE.—There is a very similar gall on the Red Elm, but differing in the following respects: (1) It is twice as large; (2) Its texture is a little thicker; (3) The surface is rough, like the leaf, not glossy; (4) The part of the leaf around the base is quite normal in appearance, showing no signs of being weakened through lack of nourishment or any other cause. Probably the difference in the vigor of the two kinds of trees and in the character of leaf will account for these differences in the galls.

Hickory Hemispherical Gall (*Dactylosphæra hemisphericum*).

This gall is nearly hemispherical in shape, is formed in the parenchyma of the leaf, and the main part of it projects above the upper surface. It varies in size, being from 4 to 10 mm. in diameter and 3 to 5 mm. in height. The color is usually pale green, often changing to a reddish shade on most of the upper surface of the gall. After maturity the gall withers and becomes dark brown and dead looking, thus greatly disfiguring the leaf. The upper surface of the gall, before it has begun to wither, is slightly roughened by a few depressions and elevations. The under surface is of a paler color, being greenish-white. It does not project beyond the surface except at the small aperture, which is a slit about $\frac{1}{3}$ of the total diameter in length. Both sides of this slit project a little beyond the rest of the base of the gall and are reflexed so as to form a mouth-like structure. The gall is monothalamous. The walls are nearly 1 mm. thick and are somewhat hard and tough in texture. There may be only one or many galls on a single leaf. In most cases where they are abundant they seem to arrange themselves in rows along the midrib, often two deep on each side. Occurs on Shell-bark Hickory (*Carya alba*). Common.

ERIOPHYIDÆ.

Buttonwood Gall (*Eriophyes cephalanthi*).

This gall usually has the form of a number of small protuberances from 1 to 3 mm. high, which have coalesced at the base into one irregularly shaped cluster. The size and extent of a cluster varies greatly; sometimes a very small part of the leaf, less than one-eighth in some cases, is affected; at other times several large clusters are found on the same leaf, and occasionally the whole leaf is covered with galls. The galls are usually of a little paler shade of green than the rest of the leaf, but the top is often reddish in color. The texture is somewhat thicker and firmer than that of the leaf. The under surface of the leaf at the affected part is usually depressed, is rough and covered with a white pubescence. The gall occurs on the Buttonweed (*Cephalanthus occidentalis*). Common in Muskoka.

Ball Gall of the June berry (*Eriophyes* sp.). Plate D, fig. 1.

This is a small, nearly globular gall averaging about 2 mm. in diameter. It is found either singly or in clusters on any part of the upper surface of the leaf. On the lower surface the presence of the gall is indicated by a very small protuberance which is covered with a hoary pubescence. The main part of the gall, as seen on the upper surface, is dark brown in color, has a slightly roughened surface and is covered with a similar pubescence to the part on the lower surface. It is monothalamous. The walls of the chamber are thin (about 2 mm. in thickness), firm, and somewhat leathery in texture. The chamber is spherical. The gall is rather broadly attached to the leaf, the constricted part being about $\frac{2}{3}$ of the total diameter of the gall. It occurs on the June berry (*Amelanchier rotundifolia*). Rare.

The Unsightly Willow Gall, (*Eriophyes* sp.) Plate D, fig. 5.

This far-from-beautiful gall seems in most cases to spring from the axils of the leaves; occasionally, however, it is formed on the leaf itself. Often several galls are formed near the end of a twig. In these cases probably they started in the axils of the leaves which were subsequently absorbed into the galls themselves. Where the galls occur near the terminus of a twig, they are usually thickly clustered and encircle the stem, whose longitudinal growth becomes checked in such cases. The galls vary greatly in size and compactness of structure. Occasionally one is found that has the appearance of a small rosette, about $\frac{1}{3}$ to 1 inch in diameter, composed of tiny, thickened leaflets covered with a whitish pubescence, the basal half of the leaflets being grown together and only the upper half being separate. In other cases a number of smaller galls are loosely clustered into one fairly large group, often an inch or more long. In other cases only a single diminutive gall is found. The galls, especially where loosely clustered, look considerably like the flower or fruit clusters of Lamb's Quarter (*Chenopodium album*), or like a very irregular whitish green fungus growth. In fall and winter they become grayish black and, where numerous, disfigure the tree considerably. They occur on the Scrub Willow (*Salix* sp.). Rare, except in a few localities.

Chestnut Leaf Gall (*Eriophyes*, sp.).

A small gall projecting from both sides of the leaf. When found along the side of the leaf-vein it is hemispherical, elsewhere is more or less spherical. The diameter is about 2 to 3 mm. Somewhat the larger half of the gall is on the upper surface. The color at first is green, but turns brown when mature. Monothalamous. Occurs on the Chestnut (*Castanea sativa*). Common.

Convex Gall of Poplar (*Eriophyes sp.*). Plate D, fig. 3.

This gall has the shape that one imagines would be formed if he were to press the tip of the little finger, or of some round instrument, against the lower surface of the leaf and, without breaking the tissues, were to cause them to yield until there was a decided depression on the lower surface and a corresponding bulge on the upper. There is practically no thickening of the tissues of the leaf or change in color except that the under surface of the gall is orange yellow. The depression varies in size, being about 4-12 mm. in diameter and 2-5 mm. in depth. Occurs on Lombardy Poplar (*Populus dilatata*). Rare.

Walnut-leaf Wart Gall (*Eriophyes sp.*).

A warty protuberance chiefly on the upper surface of the leaf, constricted at the base, about 2-5 mm. high and 2-3 mm. thick in its widest part; surface usually very uneven with many depressions and elevations; color green; texture of outer part somewhat pulpy but most of the interior is composed of a mass of loosely woven silvery fibres or strands. This gall resembles greatly the Elm-leaf Wart Gall (*Eriophyes ulmi*), but has a rougher surface at the top and is not frequently found on the under surface of the leaf. Occurs on black walnut (*Juglans nigra*). Common.

Walnut-Cushion Gall (*Eriophyes sp.*). Plate D, fig. 2.

Large and somewhat cylindrical in outline. Found on the lower portion of the petiole (in some cases the pulvillus is affected). A green solid swelling clothed by a dense fur-like covering of short reddish hairs about 1 mm. in length. The galls usually appear on the upper side of the petiole, with the edges overlapping. 8-10 mm. long and 4-8 mm. broad, but varying considerably in size. On black walnut (*Juglans nigra*).

Unsightly Poplar Stem-gall (*Eriophyes sp.*).

This is one of the most irregular and unsightly of all our galls. It is found on the stem of young twigs though sometimes it extends to the basal

part of an adjoining leaf or leaves. It seems always to start in the axil of a leaf. The stem gradually thickens at the affected part to almost three times its normal size and does not continue to elongate in this part as it does above and below it; so that in a space of 1 to 2 inches where we should normally find not more than four leaves, we here get eight or nine, some of them dwarfed and distorted. Moreover the stem at this point, instead of growing straight out in its normal direction, often becomes distorted and bent in another direction, sometimes nearly at right angles to its former course, and then coming back to its first direction grows on parallel to it. The gall itself looks like a very irregular tubercular mass of closely packed small reddish-green protuberances about ¼ inch high. These irregular masses in some places encircle the stem, in others are chiefly on one side of it though often extending to the basal part of the leaves. Sometimes the masses are so close as to be continuous, at other times they are ¼ inch or more apart. The whole of the affected part of the stem is usually from ½ to 1¼ inches in length, and the irregular mass when surrounding the twig makes the total diameter ½ to 1 inch. Later in the season and during the winter the gall is black and the part of the stem above it in most cases dies. There is usually but one gall on a stem, but sometimes a second or third occurs at some distance below it. This gall is somewhat similar to what I have called the unsightly Willow Gall, described above. It occurs on the American Aspen (*Populus tremuloides*). Rather rare.

Speck Gall of Chokeberry (*Eriophyes sp.*)

This gall, as the name indicates, is a very tiny, speck-like structure, usually much smaller than the head of a pin but occasionally a little larger. It is visible equally on both sides of the leaf and, when mature, is of a brown color. In none of the numerous specimens observed did it extend more than .5 mm. beyond the surface. The gall resembles very much a species of Eriophyes gall found on the hawthorn. Numerous galls, scattered here and there throughout the parenchyma, are usually found on each infested leaf. They occur on the chokeberry. (*Pyrus melanocarpa*). Common in Muskoka.

Grape Leaf Wart Gall (*Eriophyes sp.*).

This is a small semi-circular, or sometimes nearly circular, wart-like gall situated along the veins of the leaves. It is about 2 mm. in diameter and only very slightly elevated beyond the plane of either surface of the leaf. The upper surface is fairly smooth and slightly paler in color than the rest of the leaf. The under-surface is of much the same color and kind of surface as the underside of the leaf, but it has a tiny white nipple in the centre, and around all the gall, except the part touching the vein, there is a distinct depression or furrow. There are often several galls on a single leaf. They occur on the Wild Grape (*Vitis cordifolia*).

Pin Cherry Gall (*Eriophyes sp.*).

Oblong or club-shaped, reddish projections scattered over the leaves, somewhat irregular in outline and pubescent, 3-4 mm. long .5-1 mm. diameter, being broadest at the top. Generally borne on a little curved peduncle-like portion which is about 1 mm. long and lighter in color.

In conclusion the writer desires to express his thanks to Dr. E. Porter Felt, Mr. William Beutenmuller, and Prof. Bethune who have most kindly aided in the preparation of this paper. Especial recognition must be given to Mr. L. Cæsar, who has assisted in describing many of the species. I am much indebted to Mr. W. R. Thompson and Mr. C. D. Jarvis, who have furnished the photographs for this paper.

INJURIOUS INSECTS IN ONTARIO IN 1907.

By C. J. S. Bethune, Ontario Agricultural College, Guelph.

Owing to the prolonged cold weather during April and May the season of 1907 was remarkably backward and the appearance of our common insect pests was much later than usual. Many kinds were no doubt greatly reduced in numbers by the change from very warm days during the last week in March, which caused them to come out of their winter quarters, to the abnormal cold of the following two months. A drop of 50 degrees of temperature between the 29th of March and the 1st of April must have been a severe trial of the vitality of the early appearing species and large numbers must have succumbed to it. But notwithstanding these losses, most of our familiar insects were to be found during the season, while some were conspicuous by their absence. Among the latter may be mentioned the Squash-bug (*Anasa tristis*), which has entirely disappeared in this part of the province, though one of our most abundant pests only a few years ago. The season was marked by one great outbreak of the Variegated Cut-worm, a full account of which is given in another part of this report.

Fruit-Tree Insects.

Among insects affecting fruit, none has been more complained of this year than the codling-moth, which has taken its heavy toll from orchards throughout the fruit-growing districts. The greatest amount of damage has been inflicted in those localities where there is a second brood of the worms. Careful spraying twice in the spring with poisoned Bordeaux mixture followed by the prompt removal of all fallen fruit, should reduce the second brood to a minimum, and what survives may be successfully dealt with by bandaging the trees from the middle of July, and destroying regularly the worms that take refuge under them. These operations certainly involve much trouble and expense, but it has been many times proved that they pay well in clean marketable fruit and plenty of it. There are still some points in the life history of the codling-moth about which we continue in doubt and many careful observations in different localities are required to clear them up. Recent discussions among our most practical fruit growers show that interest in these matters has been awakened, many various opinions have been expressed and painstaking investigations may be expected. Any positive results will, no doubt, be made known at once.

Another insect that threatens to spread over the province is the Apple Maggot (*Rhagoletis pomonella*), which is quite as injurious to the fruit as the codling-worm. In the central part of the State of New York, in Connecticut and Vermont, and as far north-east as Maine, this is now a most serious pest. In many localities it is impossible to find an apple free from the attack, which spoils the appearance of the fruit and renders it worthless. So far we have only seen specimens in this country from the neighborhood of Bowmanville, and Dr. Fletcher last year recorded its presence in injurious numbers in the county of Prince Edward. Having now obtained a foothold, it is to be feared that its range will soon be extended over a wide area and that fruit-growers will have another just cause for lamentation. The damage is caused by a small white slender maggot, which burrows in all directions through the fruit, turning the flesh brown wherever it goes; it takes about six weeks to mature and then it usually causes the fruit to fall, in which case it leaves the apple and enters the ground. The parent is a small, two-winged fly, prettily marked with bands and with

golden eyes. The female punctures the fruit with her ovipositor and inserts the egg beneath the skin, consequently spraying with any poisonous mixture is of no avail. The emergence of the parent flies and their egg-laying is very irregular and may take place at any time during the summer and even when the fruit is fully formed. When this is the case apples apparently sound when picked may later on become worthless from the working of the unsuspected maggot within. Thus it may be seen that this is a very serious pest and most difficult to deal with. The only remedy so far known is to destroy all fallen fruit without delay; this should be done daily in order to give no time for the maggots to escape into the ground. The cheapest and most effective plan is to let growing pigs have the run of the orchard: they will keep the ground clear of fallen fruit and will thus devour both these maggots and the codling-worm as well.

Scale Insects. An unusually large number of enquiries have been made this year respecting scale insects and a number of different kinds have been received for identification. This does not necessarily mean that these insects have been more abundant than in previous years, but rather that fruit-growers have paid more attention to them and are realizing what dangerous enemies many of them are. The Oyster-shell Bark-louse (*Lepidosaphes ulmi*) was the species most commonly sent in; its range extends all over the province and its injuries are so apparent that they cannot escape the notice of the most careless owners of orchards. Twigs completely encrusted with the scales were received from many correspondents, showing the severity of the attack and the failure to employ any remedy. Not only do these scale insects drain out the life of the tree through the beaks of innumerable hosts, but they at the same time so weaken the vitality of the twig or branch, and eventually the whole tree, that it readily becomes a prey to canker and fungus diseases and the onslaughts of borers which only affect the sickly and the dying. Happily the remedy is simple, cheap and easy of application—lime-wash (one pound and a half of quickly slaked lime to a gallon of water) should be applied to the trees after the leaves fall in the autumn. The spraying must be thoroughly done from the highest twig to the base of the trunk so that every portion will show up white,

A second application a week or two later or before the buds open in the spring will complete the job and clear the tree. As a matter of precaution it will be well to repeat the operation during the following year. We have found many scales destroyed by a minute parasitic insect, and in some instances a fungus growth has killed the whole colony.

The San José scale is gradually spreading from its original centres of infestation in the Niagara district and Kent and Essex counties. In the former it is extending its range westward along the lake shore country towards Hamilton, and in the latter it has been found as far east as Aylmer in the county of Elgin. This spread of the insect is entirely due to the carelessness, indifference or ignorance—and perhaps indolence—of a large number of owners of fruit-trees who will not take the trouble to cut down and burn dying trees or to spray all those that are in any degree infested. The lime-sulphur wash is a complete remedy, but it must be properly made and thoroughly applied. If universally employed wherever the San José scale is to be found, it would not take many years to entirely get rid of the pest.

Several other scale insects have attracted attention, but none of them have become serious pests. There is always, however, a danger that some one or more of them may develop, if neglected, into a menace to the fruit-trees they attack. The Scurfy, Terrapin, Putnam and Forbes scales are those which have been chiefly noticed. The lime-sulphur wash, followed by kerosene emulsion when the lice are moving in early summer, will keep

these scales in check. Their presence should be looked for on Hawthorns, Mountain-ash and other trees as well as those grown in the orchard or garden.

Among other insects affecting fruit-trees that were noticeable during the past season may be mentioned the Shot-hole borer or Fruit-tree Bark-beetle (*Scolytus rugulosus*), which was somewhat abundant in the Niagara district. It especially attacked cherry-trees, on which its presence was make known by exudations of gum. This small beetle does not as a rule affect healthy trees but only those that are sickly and dying, and is often found on limbs whose vitality has been weakened by scale insects. The only available remedy is to cut off and burn all limbs that have been attacked; dying trees should be removed and all brushwood from prunings burnt.

The usual perennial insects, that are more or less abundant every year, made their presence felt this year also, such as the plum curculio, the eye-spotted bud-moth, pear-tree slug, tree cricket, rose chafer and the grape-vine flea-beetle. Fuller information regarding these insects and how to deal with them may be found in a recent bulletin by the writer on "Insects affecting Fruit-trees" issued by the Ontario Department of Agriculture.

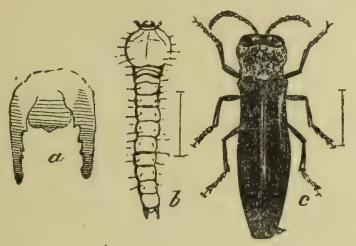

Fig. 30. Red-necked Agrillus; *a* anal processes; *b* larva; *c* beetle—much enlarged.

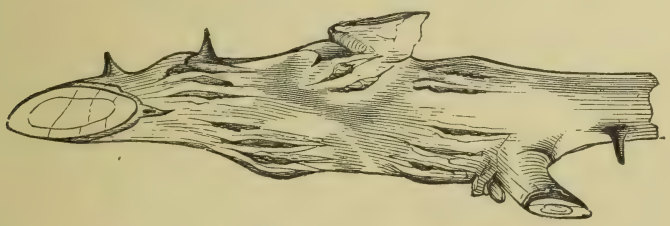

Fig. 31. Raspberry Gouty-gall caused by the Red-necked Agrilus.

Market gardeners in the neighborhood of London complained very much of an attack upon their raspberry bushes, which proved to have been made by a small beetle, the Red-necked Agrilus (*A ruficollis*). Fig. 30*c*. Portions of the canes were found to be much swollen in the form of a roughened pithy gall which rendered them liable to break off, or to dry up and die. Fig. 31. The beetle, which is about two-fifths of an inch in length, is slender in shape with a dark bronzy head, a bright coppery thorax and dark brownish wing covers. It lays its eggs on the canes in July and the grubs, which soon hatch out, burrow into the wood and by the irritation they produce in the plant-tissue cause the enlargement referred to, which is called the Raspberry Gouty-gall. The grubs are slender and thread-like, with a flat head, Fig. 30*b*, and live in the canes till the following spring, when they change to the chrysalis stage and later on appear as beetles. Cutting out and burning all affected canes is the only available remedy.

Insects of the Field and Garden.

With the exception of the outbreak of the Variegated Cutworm, elsewhere referred to, which bored holes in green tomatoes and destroyed many kinds of vegetables and flowers, there is little to report this year concerning garden insects. The tarnished and four-lined bugs, the asparagus beetles, the cucumber beetles and the turnip and onion maggots, described in last year's report, were to be found almost everywhere, but in greatly reduced numbers on the whole. Apart from Cutworms, there were few complaints from correspondents respecting our usual enemies.

Numerous requests were made for remedies against wire-worms and white-grubs. Unfortunately there is no practicable method of dealing with these underground root-feeders by poisons of any kind. The only remedy is a system of rotation of crops, by which the pastures are broken up and land is not left for a number of years in sod. Deep ploughing in the autumn brings the grubs to the surface and breaks up the pupal cells in which they are transforming to beetles; by this means the exposure to the weather and to the attacks of their natural enemies, such as birds, etc., will get rid of large numbers of them.

Owing to the unusually dry summer grasshoppers throve and multiplied to such an extent that they became a veritable plague in some localities, and inflicted a large amount of damage to oat crops, grass lands, etc. The breaking up of their breeding places by ploughing up old dry pastures and stubble fields where they have laid their eggs is a useful method for the reduction of next year's brood. When the insects are abundant in August, much may be done to get rid of them by using what is called the "Criddle mixture." This is made by taking half a barrel of fresh horse manure and mixing with it two pounds of salt dissolved in half a pail of water and one pound of Paris green. The whole should be well stirred up and then scattered by means of a trowel or piece of shingle wherever the grasshoppers are to be seen, the insects will devour this in preference to any other kind of food and be poisoned in large numbers.

Plant-lice (*Aphis*) of various kinds were excessively abundant this year, especially during the latter part of the summer and early autumn, the dry season having been favorable for their multiplication. The most serious attacks were made upon turnips and cabbages during the month of September, when complaints and enquiries came in from many parts of the province. The standard remedies for these minute insects are the contact poisons, viz., kerosene emulsion, whale-oil soap and tobacco washes. After the crop has been removed the loose leaves and stalks of the cabbages and the tops of the turnips should be taken away and the ground ploughed up; this is done to destroy the eggs, which are laid on stalks and foliage before winter sets in.

Some alarm was caused in various quarters by the newspaper reports of "the Green Bug," which was said to be inflicting enormous damage upon the wheat and oat crops in the southern and middle western States. By this name was meant a green plant-louse (*Aphis*), which is sometimes troublesome to us in Ontario. As a general rule, however, it is kept in check by its natural enemies, the lady-bird beetles and other predaceous and parasitic insects. Occasionally these are insufficient to control the pest and it becomes so abundant that it causes a vast amount of damage to the crops. This seems to have been the case in the regions referred to.

The oat crop this year was affected by a serious blight which was manifested by the leaves turning yellow and withering away. Many farmers thought that this was caused by "the Green Bug" and sent in specimens for examination. A few were found to be infested with a plant-louse (*Aphis*),

which sucks out the sap of the plant and greatly reduces its vitality; in these cases the blight might be caused by the insects' attack. But in the majority of examples which we have received and examined there was no trace of any injury by insects nor of any fungus disease. Specimens examined at the Bacteriological laboratory were also found to be free from any disease of a bacterial character. The conclusion was therefore arrived at that the blight was due almost entirely to atmospheric conditions, namely, late frosts in some localities, and in others cold, almost frosty, nights succeeded by bright, sunny days. The very late season evidently contributed to the injury, as the crop generally did not possess the vigor and vitality which would enable it to withstand the effects of occasional unfavorable weather.

REMARKABLE OUTBREAK OF THE VARIEGATED CUTWORM.

By C. J. S. Bethune, Ontario Agricultural College, Guelph.

On the evening of the 25th of July, a telephone message from Leamington was received at the Ontario Agricultural College urgently asking for help against a worm that was devouring everything before it. As no information was supplied that gave any clue to the identity of the depredator, an arrangement was at once made by the Department of Entomology to send to Leamington Mr. Cæsar, a fourth year student, and Mr. McMeans who is in charge of the vegetable gardens. They left the next morning and on the following evening Mr. McMeans brought me back specimens, which proved to be the Variegated Cutworm (*Peridroma saucia*), and gave me an account of the ravages of the insect and the advice that was given to the farmers whose crops

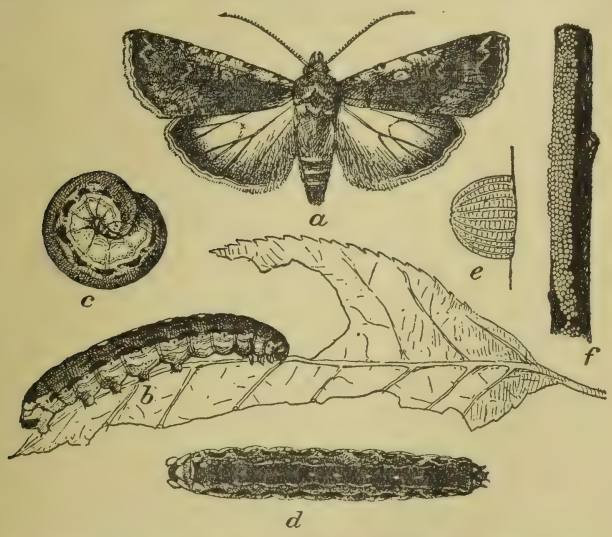

Fig. 32. *Peridroma Saucia* ; *a*, moth ; *b*, normal form of larva, lateral view ; *c*, same in curved position ; *d*, dark form, dorsal view ; *e*, egg from side ; *f*, egg mass on twig (after Howard, Division of Entomology, U. S. Dept. Agriculture).

were being attacked. Mr. Cæsar, who remained longer, subsequently gave me the more detailed report which is appended hereto. The outbreak is very remarkable, as nothing similar has been recorded since the year 1900, when these cutworms appeared in enormous numbers in British Columbia and the neighboring Pacific Coast States and were unusually abundant in

Manitoba, Ontario, and many of the States to the south-west of us. Dr. Fletcher, in his annual report for 1900 (pages 215 to 227), gives a very full account of the insect and its ravages in British Columbia during that year.

Near Leamington the worms were first observed in clover fields, where they soon devoured the crop and left the ground bare and black; they then marched on to the next field and consumed whatever vegetation they met with; corn and tobacco, tomatoes and other vegetables seemed especial favorites for consumption. If a fruit tree happened to be in their way, they climbed it and devoured both fruit and foliage; many peach trees were thus attacked and the fruit ruined.

Like other cutworms these caterpillars feed only at night and remain in concealment during the day, hiding in the ground where the soil is loose, and under any rubbish or other shelter that they can find. When full-grown the worm is about two inches long, with a yellowish stripe on each side above the legs, the rest of the body is darker and mottled with black, white or grey; the most characteristic feature is a row of yellow or white spots, five to seven in number, along the middle line of the back. Fig. 32. Some of the worms changed into the chrysalis stage early in August, others later; for this purpose they buried themselves in the ground and formed there an oval earthen cell. The moth, into which they finally turned, has a wing expansion of about an inch, and is dark blackish brown in color, often clouded with red towards the front margin of the wings, but with no conspicuous or distinguishing markings; the underwings are white with a pearly lustre. Like so many other of our most destructive insects, this one has come to us from Europe.

Report by Mr. L. Cæsar to C. J. S. Bethune, Professor of Entomology.

Sir,—I have the honor to submit the following report of my trip to Leamington, July 26th to 29th, to aid the farmers in their struggle against an insect pest that seemed to be devouring everything before it.

I arrived at Leamington about sunset, July 26th, and at once set out for the farm of W. T. Moore, who was the first to propose sending to your department for aid. By the assistance of a lantern we were able to see the caterpillars at work on Mr. Moore's tobacco and tomatoes. They proved to be the Variegated Cutworm (*Peridroma saucia*) and were very numerous, Mr. Moore on one occasion counted as many as 250 on a single plant. They had begun their ravages in a small plot of second growth clover which he was keeping for seed. To check them Mr. Moore at once plowed this down and rolled it, thereby no doubt destroying countless numbers; but many still remained. Finally, in his efforts to keep them from destroying his tobacco and tomatoes he had hit upon the device of plowing a furrow ahead of them. This, in a very sandy soil like his, gave excellent results and impeded the progress of the caterpillars better than one would have thought possible, especially as they climb corn stalks and trees without difficulty. The fine grains of sand, however, yielding as they tried to climb, made an insuperable barrier in most cases. I recommended Mr. Moore to make holes with steep edges and about one foot deep at intervals of about every twenty feet in the furrows. Next morning I had a chance to see the work of the furrow and holes combined on an adjoining farm. The result was most gratifying to all of us. In every hole there was a mass of caterpillars an inch or more deep. The farmer went from hole to hole with a piece of fence rail about five feet long and pounded his foes in each hole to death, evidently taking much pleasure in the operation.

Though I saw that very few caterpillars had been able to escape from the furrow and holes, yet as an extra precaution I advised that the uninjured plants immediately in front be sprayed with a strong mixture of Paris green and water, or that poisoned bran be scattered among them. Mr. McMeans of the Horticultural department, who was with me, suggested shorts as an alternative for bran.

After arranging to come back in the afternoon and superintend the preparation of the poisoned bran or shorts, I was driven by Mr. Moore to several other farms which were reported to be attacked by the same pest. Of these one belonged to Mr. Quick. This gentleman, the night before I came to Leamington, had lost more than an acre of good tobacco by the attack of caterpillars. Practically nothing had been left of it. Having heard, however, of the furrow plan, he at once ploughed one and the next night was delighted to observe by the aid of his lantern that it seemed to be an effectual barrier. I mentioned a few ways in which I thought Mr. Quick could improve his furrow and also told him of poisoned bran or spraying with Paris green as further remedies. There was evidently a good deal of scepticism in his mind and in the minds of some other farmers as to the efficacy of Paris green in any shape or form. Probably this was because they did not see dead caterpillars lying on the plants or on the ground where they had tried spraying. They could scarcely be expected to think of their having buried themselves and died in the ground. However, I told them to come down and see how the experiment with the poisoned bran resulted at Mr. Moore's.

The next farm visited belonged to Mr. Copeland. Here I saw the most discouraging sight I had witnessed anywhere in the district. From several acres of clover the caterpillars had spread out in a single night and attacked in enormous numbers about two acres of beautiful corn and ruined it. Not only had they attacked the leaves but they had eaten through and through the stalks themselves. In addition to the corn they had attacked two rows of peach trees that were about three years old. If one of these trees were given a quick shake numerous caterpillars would fall from their hiding place among the foliage to the ground. Here again Mr. Copeland, having heard of the furrow and holes had resorted to this device to save the rest of his crop. It was interesting to see the host of caterpillars in the large holes he had made. So strongly did he trust to his furrow and holes that he was leaving to sun to do the work of destroying the caterpillars for him. Practically none seemed to be escaping, but I advised their immediate destruction in whatever way he wished, whether by boiling water, by kerosene, or by pounding with a stick as his neighbor had done.

Several more farms were visited and the best remedies I knew of explained to the farmers, many of whom had no idea of what they ought to do.

On my return to Mr. Moore's in the afternoon I helped him to make up what little bran he had into a poisoned mixture. The method I employed was to sweeten some water with black-strap, then moisten the bran with it and add the Paris green little by little to the moistened bran, mixing it thoroughly. I believe that a better and easier way would have been to make a paste of the Paris green with a little water and then add this gradually to the moistened bran and mix thoroughly. The trouble with the former method was that in spite of every precaution the Paris green tended to form flakes and could with difficulty be got to mix up finely with the bran. It was impossible, however, to get any more bran or shorts in the town, so we used flour and Paris green, mixing them dry. This was put on by means of a Planet Junior hand-drill, a very convenient method. Mr. Moore pro-

mised to observe by lantern light the results of our experiments with the bran and flour mixtures respectively. So after watching some spraying of hedges around a clover field, I returned to the town.

Late that night Mr. Moore met me in town and seemed very much pleased with the experiments. He reported the poisoned flour a decided success. He had less to say about the poisoned bran.

Illness during Sunday, July 28th, prevented my visiting any of the operations which I heard were going on all that day. A few farmers, however, met me and made enquiries how to fight the pest. At the request of several of the most intelligent farmers, I arranged early Monday morning for the publication and distribution of 1,000 leaflets giving instructions how to combat the caterpillars. Having seen to this and visited two infested farms where I saw that the foe was still under control I felt compelled by continued illness to return to Guelph at once.

It may be of interest to note that on at least two farms large flocks of cowbirds were seen feeding upon the caterpillars. I looked for signs of Tachina flies and other parasites, but saw none attacking the caterpillars; these were, however, great numbers of cocoons of Braconids to be found on the clover leaves. I brought some of these home and reared several adults from them.

Respectfully submitted,

L. Cæsar.

TWO-WINGED FLIES.

By Rev. Thos. W. Fyles, D.C.L., F.L.S., Levis, Que.

Two-winged flies seem to be everywhere in evidence. They are met with as far north as man has made his abode; and they abound in tropical regions. In light or darkness, be the weather fair or foul, in early Spring and late Autumn—aye, and under favorable circumstances in Winter also—two-winged flies are to be found.

Baron Osten Sacken, in his "Catalogue of the described Diptera of North America," gives the names of no less than 4,077 species of these insects; and doubtless there are many more unnamed species, belonging to the order, that will be found as time goes on and dipterologists increase. The same distinguished naturalist groups the flies into 64 families. It may well be believed that such formidable numbers are deterrent to the study of the Diptera.

Moreover, there is, I think, a prejudice, formed in early life, against the two-winged flies. The annoyance caused by house-flies, gnats, and cattle-flies, the abominable character of the blow-fly, the accounts of the *tsetse* and other hurtful species, all tend to create an utter dislike to the Diptera that is hard to overcome. I know that as a boy I was not much impressed by the story—told as a warning—of the ill-famed and ill-starred Roman Emperor who amused himself by killing flies. Questions arose in my youthful mind as to whether, in so doing, he was not acting as a public benefactor; and I am inclined to think that many a mother who in the nursery, would tell her children not to be cruel and kill flies, would, in the kitchen, spread a sheet of "tangle-foot" without compunction.

Yes—the order Diptera is not generally regarded with favor. Nevertheless, as Mr. Macy says in *Silas Marner*, "a fly is a fly, though it may

be a hoss-fly,* and the habits of even this depreciated "hoss-fly" are so remarkable and its life-history is so strange, that, duly observed, they cannot fail to interest.

Undoubtedly many of the two-winged flies cause annoyance, both to man and beast; some are highly destructive to our food-supplies; some, on the other hand, are useful in keeping down the numbers of other insects, and others again, in consuming animal and vegetable substances that would cause harmful exhalations.

I shall endeavour to guard against wearying my readers with minute descriptions of many species. I hope to kindle an interest in the Diptera by telling of peculiarities in the structure and habits of some of the more remarkable of the kinds that have come under my notice.

The first family in Osten Sacken's list is the *Cecidomyiidæ* a very important group of insects. In it come two of the worst insect pests that have troubled the Agriculturist, viz., the Hessian Fly (Fig. 33), *Cecidomyia destructor*, Say, and the Wheat Midge, *Diplosis tritici*, Kirby (Figs. 34 and 35).

Fig. 33.—Hessian Fly —greatly magnified.

Fig. 34.—Wheat Midge—natural size shewn below.

Fig. 35.—Wheat Kernel attacked by Midge.

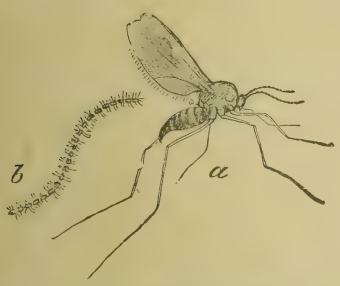

Fig. 36.—Willow-gall Midge—*a* the fly, much enlarged, *b* antenna highly magnified.

Fig. 37.—Diplosis grassator—1 larva, 2 pupa, 3 fly, side view, 4 fly, under side (original).

Of *C. destructor*, two broods appear in the year—one in May, the other in September. Each female fly lays about 30 eggs, on the blades of wheat, or of some other kind of grass. The eggs are minute, cylindrical, red points.

*"And you're a doctor, I reckon, though you're only a cow-doctor—for a fly's a fly, though it may be a hoss-fly," concluded Mr. Macey, wondering a little at his own "cuteness."—*Silas Marner*, ch VII

They hatch in a week if the weather is warm; and the little white maggots work their way down between the leaf and the stem of the plant, till they come to a joint; there they commence to drain away the juices of the plant. About the first of June, the maggots go into what is called the "Flaxseed stage," because of the shape and color of the pupa case, or "puparium." The perfect insects appear in August, and lay their eggs for the second brood. Where Fall Wheat is grown it should not be sown till September; and Spring Wheat should not be sown till the end of May.

Diplosis tritici became very destructive in Lower Canada in 1834. In 1856 it was estimated that the loss on wheat in Canada, occasioned by the Midge was $2,500,000. The perfect insect is a minute, orange-colored fly, with black eyes, yellow legs, and wings that resemble thin films of mica. It makes its appearance when the wheat is in flower; and the female lays her eggs in the floret—the harm done by this insect is directly to the kernel (Fig. 35). The maggots get their growth in three weeks, and then wriggle to the ground and bury themselves, remaining unchanged through the Winter, and going into pupa in the Spring. The flies come forth in the end of June. Because of the damage done by this insect, and because Western flour can be bought so cheaply, our farmers in Quebec Province have, very generally, abandoned the growth of wheat.

A very interesting Cecidomyian is *C. strobiloides*,, Osten Sacken (Fig. 36). This fly lays an egg in the terminal bud of a shoot of sallow. The little orange-colored grub that comes from the egg so affects the bud, that it develops into a good-sized cone-shaped gall, which becomes dry and hard as the Winter advances. In the centre of this gall, and in a delicate, membraneous cocoon, the grub remains till early Spring, when it changes to a pupa. In April or May the perfect flies appear. When I was studying these creatures I opened some of the galls to watch the changes of the insect, and, as I thought, to aid the prisoner to escape, but the interference did harm; the fly from the open gall was always defective—as we say "crippled." It seemed as if the effort on the part of the insect to work its way upward, was absolutely necessary to the attainment of its higher life. And in this we have one of Nature's many parables.

A fly of great economic importance is *Diplosis grassator*, Fyles (Fig. 37), which in this country preys upon and keeps down the numbers of the dreaded *Phylloxera vastatrix*, Planchon.

The story of my discovery of this insect is as follows:

In the summer of 1882, I spent some time at Como, on the Ottawa with my friends, Mr. and Mrs. I. J. Gibb. Growing over the fences of the highway which ran through their estate, and extending for many yards, were several native vines. They were badly infested with *Phylloxera vastatrix*. As this pest was then exciting much attention, I was pleased with the opportunity of studying its habits. I soon found that at this place it was assailed by a formidable foe, an orange-colored dipterous larva. The business-like way in which this creature gave the *quietus* to the larva of the Phylloxera aroused my curiosity, and I resolved to study the species carefully. Accordingly I took a mass of the affected foliage home to Cowansville, where I then resided, and arranged for fresh supplies, properly secured, to be sent to me by post. At home I spent much time at the microscope, observing the structure, habits, and metamorphoses of the species; and I made, with the utmost care, drawings of it in its larval, pupal, and imago stages.

The Annual Meeting of the Entomological Society of Ontario was held that year in Montreal, and was attended by a number of scientists from the

United States. Among them were Professors Lintner, Hagen, and Riley. I brought the insect under the notice of the meeting. No one present professed an acquaintance with it, except Dr. Wm. Saunders (see 13th An. Rep. Ent. Soc. of Ont. p. 10); but Dr. Riley, from the description given, and the specimens shewn, pronounced it to be a species of Diplosis.

I then wrote to Dr. Williston, sending him particulars, and asking him for information He very kindly replied, furnishing me with references to a number of species of Cecidomyia, and adding:

"It is probable that your species is not one of these, but new. Still I should examine the subject as far as possible. At all events its life's history is interesting, and worthy of immediate publication. *L. vitis* is the only species in which the imago and complete life history are known."

Acting upon Dr. Williston's suggestion, I sent the life-history of the insect, with illustrations to the "Canadian Entomologist."

They appeared in the December number of the magazine (Can. Ent. Vol. XIV, p. 237), together with a confirmatory statement from Dr. Saunders, the editor. The number was printed January 10th, 1883.

On the 27th of February, 1883, I received a kind letter from Dr. Hagen, who said, with reference to *D. grassator*—specimens of which I had sent him: "The fly is, I think, a Cecidomyia. I think it is not sure that it belongs to Diplosis. At least the reticulations of the wing differ in having the median veins straight, and the fork at the hind margin wanting. You will see in Osten Sacken's Catalogue, that the museums do not possess this type for Cecidomyia. I have gone through the literature, and find, till now, that your species is not described."

D. grassator is not a gall-producer like certain Cecidomyians spoken of by Walsh and Riley.

Its larvæ do not extract sap from galls as do those of *C. albovittata*, Walsh.

They do not feed on fungi, like those of *D. coniophago*, Winnertz.

They have not horny hooks at the tip of the abdomen like those of *C. populi*, Duf.

They are not white, like those of *D. caryæ*, O.S.

They do not go under ground to pupate like those of *Lasioptera vitis*, O.S.

The pupa has not two oblique processes from the anal end, like that of the *Lucopis* mentioned by Riley.

The imago has not violet-blue spots, nor are tibiæ and tarsi annulated with black, as in *D. maccus*, Lœw.

It is not brownish-black with white hairs like that of *C. (Diplosis) Pini*, De Geer.

Its thorax is not blackish above with a golden pubescence as in *Lasioptera vitis*, O.S.

I think I may say with all confidence, that my account of the insect, with the notes of Drs. Hagen and Saunders, and the illustrations given afford sufficient specific distinction for the recognition of the insect.

If *D. grassator* had been carried to France with the American vines introduced by the Duchess of Fitzjames, the loss to the Gironde, amounting to $100,000,000, might have been lessened, and the vineyards ultimately saved.

In the next family, the *Pulicidæ*, Packard and others have placed the Fleas. These creatures, though they have no wings, are shown by the form and habits of their larvæ, to be rightly placed. Of their many species *two* are very well known—*Pulex irritans*, Linneus, the Human Flea, and *Ceratopsyllus serraticeps*, Gervais, the Cat and Dog Flea (Fig. 38).

About fifty years ago an ingenious Italian (said to have belonged to a good family in his own land), was employed by Sir Edmund Head, as steward, and afterwards in the same capacity by the Stadacona Club of Quebec. Bertolotto—for that was his name—observing the structure of the flea, its great strength, and its rigid, protective armor, conceived the idea of harnessing the insect, and turning it to account for the amusement of himself and his friends.

And here I would say that I am indebted for most of the information that I can give, respecting Bertolotto and his Fleas, to D. Jewell, Esq., broker, who was intimately acquainted with Bertolotto, Lt. Col. Gray of H. M. Customs, who was a member of the Stadacona Club during the time of Bertolotto's stewardship, and the Rev. E. A. W. King, M.A., Rector of St. Peter's, who witnessed one of Bertolotto's exhibitions in Boston, Mass., at the time of the American Centennial (1876). These gentlemen are all living in Quebec.

Bertolotto broke his fleas of the habit of jumping, by confining them in a glass tube about half an inch in diameter. He fastened a silken tie around the waist of each; by means of this he could attach them to various contrivances. He made a small carriage, fastened fleas inside as passengers, a flea on the box as coachman, and a flea behind as footman or guard. Then fastened fleas to the pole as horses. These soon found that "a long pull, a strong pull, and a pull all together," was the way to advance; and so the equipage moved on, to the delight of the observers. A number of like contrivances made up a show, that from its very novelty, became popular, and consequently remunerative; and Bertolotto travelled to exhibit it.

I have been told that, on a certain occasion, when giving a parlour entertainment, before some exalted personages, Bertolotto discovered, to his dismay, that his leading performer, his best trained flea, which he had named Napoleon, had made its escape. In the warmth of his southern temperament he bewailed his loss—"Oh, my Napoleon! My Napoleon is gone! What shall I do?"

As the escape of Napoleon the Great from Elba occasioned dismay amongst the powers of Europe, so the escape of Napoleon the Little occasioned disturbance in the minds of the ladies present—they anticipated dire attacks.

Presently one of the fair ones hastily left the room. Soon afterwards a maid came in, bearing a plate, and on the plate a glass, and under the glass *a flea*. Bertolotto welcomed it with delight. But telling the story afterwards he said, "Lo and behold, *it was not my Napoleon at all!*"

The Rev. Mr. King thus described the performance he witnessed:—"Bertolotto stood behind a counter, and had a sheet of glass before him. His visitors were seated round the room. Three or four persons came up to the counter at a time. Bertolotto first exhibited a small house, that he called the "Fleas' Hotel"—he had about 50 fleas in it. Then *an uneducated flea*, fastened by a fine gold chain to a small ball, was shown. This flea jumped about wildly. After that a Flea Orchestra was exhibited; about twenty-five fleas, each bearing a minute imitation musical instrument, were placed in a semicircle, and went through the motions of playing upon their instruments, while a musical box gave forth a tune. The Prince of Wales in India was represented; a toy elephant bearing a howdah was set out; fleas represented the prince and his attendants, and a flea was the mahout. A Military Review; the Coach and Horses; a Flea working a windlass that brought up a small bucket, etc., etc., were shown."

Questioned about the feeding of his fleas, Bertolotto said that he fed them only at night; and he showed a red place on his wrist—a token of the *phle*-botomy he had undergone the night before.

When he was asked, "Where do you get your fleas?" he replied, "Not in Massachusetts; the fleas here are too poor—they are no good. *I have to send to Canada for the good ones*!"

Mr. Jewell has given me an original ticket for Bertolotto's show. It reads:—

"Signor Bertolotto's
original exhibition
of the
EDUCATED FLEAS
Now open at 39 *Union Square*,
From 10 a.m. to 6 p.m.
Admission 25c
Programmes in the Exhibition Rooms."

Between the words *original* and *exhibition* there is a small engraving of a flea with a soldier on its back.

The family Simulidæ is an objectionable one.

I lived many years ago in a cottage near a brook, which meandered through a valley, and fell into a neighboring lake. This brook abounded with the pretty little trout, *Salmo fontinalis*.....It also abounded with the larvæ of the Black Fly of the North, *Simulium molestum*, Walker, which are said to be harmful to the young fry of the fish.

The Black Fly itself is a compact insect having a stout proboscis with which it inflicts a more severe wound than that given by the mosquito. I have seen the faces and necks of children running with blood from the bites of this insect.

There is a stately White Willow over-shadowing my yard at Levis, and other trees are near. In the calm summer evenings, when the light has been fading, I have often sat upon my verandah and watched the mazy dance of *Plecia heteroptera*, Say, plainly seen against the western afterglow. This insect is a *black* fly—entirely black; but it is "guileless of offence." It belongs to the family Bibionidæ.

The disreputable family of mosquitoes known as the Culicidæ have been ably set before us by Howard, Smith and other writers. Our common species at Quebec is *Culex consobrinus*, Robineau-Desvoidy.

Drain the land, stock the pond with fish, keep the water-butts closely covered, banish the mosquitoes—"their room is better than their company."

A very interesting family of two-winged flies is that of the Tipulidæ. The typical insect of this is the Tipula, Crane-fly, or Daddy-long-legs.

The finest of our Quebec Tipulidæ is *Tipula flavicans*, Fab. It has an expanse of wings of nearly two and a half inches; and its legs when extended reach over a space of three and a half inches diameter. The wings of this insect are prettily veined and are spotted with brown and white. Its long abdomen is light with dark brown markings.

A very pretty Crane-fly is *T. trivittata*, Say. It has three smoky brown bands crossing the wings, and the wing tips are clouded with the same color.

A very common insect in our woods is *T. cincta*, Lœw. It is very Quaker-like in its coloring, having body, legs and wings of a sober drab.

Smaller and brighter in color is *T. ferruginea*, Fab. Its prevailing color is orange-red.

Pedicia albivitta, Walker, is a larger and handsome Crane-fly. It may be readily distinguished by its brown costa and the obtuse-angled triangle raised upon it. In the male of the species there is a brown line running from the obtuse angle to the hind margin of the wing.

In June, 1896, I took, in the grounds of my friend Mr. Wheeler, at Bergerville, a fine species of *Ctenophora*. Its head and thorax are jet black, polished; its abdomen is black, excepting the two first segments which are

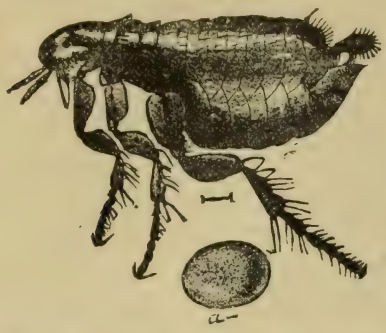

Fig. 38. Cat and Dog Flea, greatly magnified; *a* the egg.

Fig. 39. *Bittacomorpha clavipes*. (original).

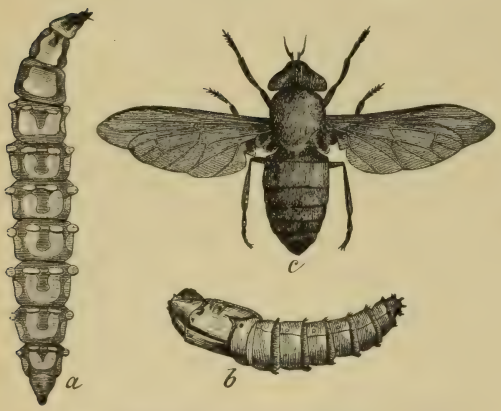

Fig 40. Black Horse Fly; *Tabanus atratus*.

Fig. 41. Robber Fly; *Asilus*.

Fig. 42. *Pterodontia flavipes* (original).

Fig. 43. Syrphus Fly.

Fig. 44. 1. *Odynerus tigres*. 2. *Temnostoma bombilans* (original).

Fig. 45. Tachina Fly, parasite of the Army-worm.

bright red. The legs are red. The wings are somewhat smoky; their veins are dark brown distinctly marked, and there is a brown spot on the costa at about one-third the length of the wing, counting from the tip.

But I think the most remarkable of the near relatives of the Tipulidæ is *Bittacomorpha clavipes*, Fabricius (Fig. 39). This creature has trans-

parent wings, a thin body, and long legs banded with white. When it flies you do not see its wings—it seems to float like a film. It is an insect fairy.

One female Crane-fly will lay about 300 eggs. These are small, black and glossy. They are laid in, or close to, the ground. The grubs that come from them are familiarly known as Leather-jackets. They feed on the roots of grasses, corn, etc., and sometimes do much damage. Unlike other maggots the larva of the Crane-fly has a well-marked head, black and horny, with a pair of strong black jaws; and a pair of small horns. At the blunt extremity of the creature are four tubercles. The grubs turn to pupæ in the ground; and the flies appear towards the end of summer.

Fall ploughing, rotation of crops, lime-dressing for the land, drainage, all help to keep the numbers of the Leather-jackets down.

The perfect flies are quite harmless. They are remarkable for the seeming ease with which they part with their limbs. I find it rather a difficult matter to obtain perfect cabinet specimens of them.

In the Cœnomyiidæ comes the *Cœnomyia pallida* of Say. This fly is figured by Gosse in the *Canadian Naturalist* p. 199. It is believed to be the same as the *C. ferruginea* of Europe. I have four fine specimens in my collection. They were taken in the Eastern Townships, at different times. The fly is fawn-colored throughout, with large blue-black eyes.

The family Stratiomyidæ numbers some fine insects. One of them is quite common at Quebec, viz., *Stratiomyia obesa*, Lœw. It has a yellow face jet black eyes, a black body marked with yellow stripes; its legs are yellow, and its wings are light fawn-colored, darker on the fore part of the wing. It is a handsome fly.

A family of objectionable insects is the Tabanidæ. Amongst them comes that annoying fly, *Chrysops fugax*, Walker, which does its worst to spoil the entomologist's pleasure in the woods and fields, especially when there are cattle near. This fly is black, and has a brown patch in the centre of the wing. There is no mistaking it—its incessant audacious attacks make it known.

Happily we have not in Quebec the formidable *Tabanus atratus*, Fab. (Fig. 40). But the fine fly *Tabanus rufus*, Palisot Beauvois, often made its appearance round my stable when I kept a horse and cows. It is three-quarters of an inch in length of body, and an inch and a half in expanse of wings. Its prevailing color is brick-red.

To the Asilidæ belong the Robber Flies (Fig. 41), which are so named from their habit of pouncing down upon the backs of other insects and destroying them.

I have seen the King Bird alight, with the utmost daring and dexterity, upon the shoulders of the Hen Hawk, and peck at its head to drive it away from the neighborhood in which the little King Birds were gathered. And the Robber Flies do not hesitate to pounce down upon such formidable insects as wasps and bees—not merely to put them to flight, but to drain away their life-juices. Our commonest kind is *Asilus Novæ-Scotiæ*, Macquart.

The Bombylidæ are an interesting family. From their habit of hovering over blossoms, they are called Bee Flies. *Anthrax fulviana*, Say, is quite common at Quebec. Its brown body is covered with a yellow down, and its wings have an irregular brown border along the costa. A less bulky and prettier fly is *Anthrax sinuosa*, Wiedemann. This is dark brown in color, and its wings are of a rich warm brown, but have a clear space along the hind margin. In the genus *Bombylius* we have *fratellus*, Weid., *major*, Linne, and *pygmæus*, Fabricius. The last named is a veritable fairy. Its small brown body is edged with yellow; its wings are richly

spotted with black, and have a brown bar along the costa; and its proboscis extends in a straight line from the head—as is the case also with *fratellus* and *major*.

Of the Leptidæ I have taken *Leptis Boscii*, Macquart, at Quebec; of the Empidæ, *Rhamphomyia umbrosa*, Lœw.; and of the Therevidæ, *Thereva senex*, Walker.

A fly of strange appearance is *Pterodontia flavipes*, Gray (Fig. 42). It is oval in shape and raised, and looks like a large Lady-bird. Its colors are black and red. It comes in the family Cyrtidæ. I have taken a few specimens of this fly at the Gomin Swamp.

The family Syrphidæ contains a number of remarkable flies. Some of them have a strange resemblance to wasps (Fig. 43). One day when seeking in the woods for additions to my collections of the Vespidæ, I saw what I took to be a fine female of *V. arenaria*. I caught it and found that it was a specimen of the Syrphid, *Spilomyia fusca*, Lœw.

Milesia eccentrica, Harris, resembles a yellow wasp, and so in less degree, does *Chrysotoxum derivatum*, Walker.

Temnostoma bombylans is a handsome fly belonging to the Syrphidæ. I do not know its history; but the creature bears so striking a resemblance to *Odynerus tigres*, that I suspect it to be a familiar of that wasp (Fig. 44).

Sericomyia militaris, Walker, is quite common at Quebec. It probably derives its name from the yellow bands on its abdomen, which look like the facings of a soldier's coat.

Spilomyia quadrifasciatus, Say, is a large, handsome fly. Its long, cylindrical abdomen has a conspicuous golden band round the upper part.

The rat-tailed maggots of *Eristalis tenax*, Linneus, thrive in polluted water. The tail is a breathing-tube. The flies of the species may easily be mistaken for drones of the Hive Bees, and are commonly called Drone Flies. Besides this species, *E. transversus*, Wied., and *E. dimidiatus*, Wied., are common at Quebec.

Volucella evecta, Walk., is very common with us. Its Larvæ are found in Bumble Bees' nests.

I have taken three specimens of the pretty fly *Conops furcillatus* upon flower-heads. The larvæ of the Conopidæ are said to be parasitic in the bodies of Bumble Bees.*

In the Œstridæ we find the Bot-flies of the horse, ox, sheep, etc. The Horse Bot-fly, *Gastrophilus equi*, Meigen, lays its eggs on the fore-legs of the horse. The larva, leaving the egg, causes irritation and is licked off by the horse. It is carried in the saliva to the stomach of the animal. There it attaches itself, and from thence on getting its growth, it is voided.

The larvæ of the Ox Bot-fly or "Warble-fly," *Hypoderma bovis*, Fab., cause tumors in the back of the ox, which injure the skin—a grubby hide is of one-third less value than a sound one.

The Sheep Bot-fly, *Œstrus ovis*, Lin., lays living maggots in the nostrils of the sheep. These crawl into the frontal hollows of the sheep's head, and get their growth there.

The family Tachinidæ is a large one, Fig. 45. In it we have *Histricia vivida*, Harris, a showy bustling insect, with a rounded, red abdomen, set with black bristles. It is common and well known.

*"The Conopians undergo their transformations in the bodies of humble bees, their young subsisting on the fat contained within the abdomen of their luckless victims."—Harris, "Insects Injurious to Vegetation," p. 611.

Another fine insect in the same family is *Echinomyia florum*, Walker. It is of a glossy blue-black, with light sienna-colored wings, and has a yellow patch on either side of the first joint of the abdomen.

Gonia capitata, DeGeer, is a prettily banded fly, also in the Tachinidæ. It frequents flower-heads, and was abundant at Quebec two years ago.

A fly of strange habits is *Sarcophaga sarraceniæ*, Riley, Fig. 46, belonging to the family Sarcophagidæ. In the pitchers of the plant, *Sarracenia purpurea*, will be found a decaying mass of insects, which had been attracted by, and drowned in, the liquid that the pitchers contain. Into this corrupting mass the fly, *S. sarraceniæ* drops her eggs. The maggots from these thrive in pollution and, after attaining their growth, bite a way through the side of the pitcher and fall into the surrounding herbage, in which they undergo the pupal change.

The Muscidæ form another large family, Fig. 47. In it we find *Musca domestica*, Linn., *Lucilia Cæsar*, Linn., *Sarcophaga carnaria*, Linn., household pests too well known.

In the Anthomyidæ comes the troublesome *Anthomyia raphani*, Harris, which spoils our radishes.

The ochre-colored Dung-fly, *Scatophaga stercoraria*, Linn., is common. It is a representative of the Cordyluridæ.

Fig. 46.—Sarcophaga sarraceniæ.

Fig. 47.—A Muscid Fly.

Among the Ortalidæ is found that most remarkable and handsome fly, *Pergata undata*, Wied., which is figured on page 610 of "Insects Injurious to Vegetation" by Harris. I have taken several specimens of this fine fly in the Eastern Townships.

Another beautiful insect belonging to this family is *Chætopsis ænea*, Wied. It has a glossy blue body, and pretty banded wings. I have found its maggots preying upon Lepidopterous larvæ, in the stems of bulrushes, and have raised the perfect insects from them.

Of insects in the family Trypetidæ I have taken at Quebec, *Straussia longipennis*, Wied., *Eutreta sparsa*, Wied., *Eurosta solidaginis*, Fitch, and *Tephritis albiceps*, Lœw.

It is *Eurosta solidaginis* that inhabits the large, round pithy galls that are found on the Golden Rod.

In the Piophilidæ comes the well known *Piophila casei*, Linn., whose larvæ are the "hoppers" found in cheese.

There are some other families of Diptera to which it does not come within my present purpose to refer. I have endeavored to compress within the limits of this article such information as seemed to me likely to arouse an interest in the two winged flies, and to convey ideas of their number, variety and habits. Every species has doubtless its peculiar life-history —known or unknown, to man. Every species fulfils its purpose in the economy of Nature. They all bear testimony to the marvellous resources of the Divine Creator, who *in Wisdom hath made them all.*

SUMMER MEETING OF THE ENTOMOLOGICAL SOCIETY OF ONTARIO.

A summer meeting of the Society was held at the Ontario Agricultural College, Guelph, on Thursday and Friday, July 4 and 5, 1907. Through the kindness of President Creelman the members from a distance were hospitably entertained in the College residence during their visit, the ladies of the party being provided for in the Macdonald Hall. The number in attendance was smaller than anticipated, many who had been looking forward to taking part in the meeting being prevented from coming by a variety of causes. A very satisfactory audience, however, was made up by the Summer School of Ontario teachers from the Macdonald Institute, and several students and members of the College staff. The sessions began on Thursday afternoon in the lecture-room of the Biological Department, the President of the Society, Dr. Fletcher of Ottawa, being in the chair. Mr. H. H. Lyman, of Montreal, read a paper on the distinctions between *Thecla calanus* and *Edwardsii*.

Dr. Brodie, of Toronto, described the life-history of a colony of the Tent Caterpillar and related his experiences in breeding a large number during a series of years in order to observe the effects of parasites upon them.

Dr. Fletcher gave an account of a visit he recently paid to Massachusetts and described what was being done to control the Brown-tail and Gypsy moths by the importation of parasites from Europe and by practical field operations.

Mr. C. W. Nash, of Toronto, spoke on "Balance in Nature," in which he described in a very interesting manner some of the numerous checks and counter-checks which are provided in order to prevent the undue preponderance or the extermination of any particular species, and showed how this balance had been upset by man's disturbing agency and the difficult problems that had arisen in consequence. A discussion followed which was participated in by the chairman, Dr. Brodie, Prof. Bethune, Mr. Jarvis, Mr. Cæsar and others.

In the evening the session was held in the Nature Study Lecture-room of the Macdonald Institute and was attended by the Summer School and a number of others from the town and College as well as by the members of the Society. Dr. Henry Skinner, of Philadelphia, gave a highly interesting lecture on "Insects as Carriers of Diseases." Mr. C. W. Nash followed with a lively address on "Instinct *vs.* Education" and Dr. Fletcher spoke in his usual attractive manner on "Nature Study as a Means of Education." The evening was thoroughly enjoyed by all present and no doubt the school teachers carried away with them much information and many impressions that will be of value to them in the future.

The next day, July 5th, was given up to an excursion to Puslinch Lake, a picturesque sheet of water about nine miles from the College. The Summer School joined in the picnic, making up a party of more than sixty in all. The day was spent in collecting botanical and entomological specimens and other objects of interest. At the close short addresses were given by members of the College staff and others on various specimens that had been brought in, including fresh-water shells, insects, and plants. The meeting on the whole was so delightful and successful an experiment that it will no doubt be repeated in future years and become annually more attractive and well-attended.

ENTOMOLOGICAL RECORD, 1907.

By Dr. James Fletcher and Arthur Gibson, Ottawa.

The season of 1907 in Canada will long be remembered for its unusual and irregular character. The spring, right across the continent from the Atlantic to the Pacific, was cold, dry and late. As a consequence, insects of all kinds were remarkably scarce, and the paucity of insect life in April and May had a direct effect on bird life as well as in many places also upon the fruit crops. Where fruit growers were fortunate enough to have colonies of bees near their grounds there was a conspicuous advantage to the crop from the much larger number of flowers which were fertilized by these useful agents and friends of the fruit grower. The main migration of warblers and other insect-eating birds was much delayed by cool weather and the tardy revival of insect life. The exceptionally backward nature of the season continued throughout the summer and was only in a measure compensated for by the long open autumn without killing frosts. From an entomological point of view, we seem to be passing through a period of "poor years," which began with the year 1901. Notwithstanding this, there has perhaps never been a time when better work has been done in investigating the insect fauna of the country. This is directly due to the far higher appreciation of the value of entomological studies, the greater number of workers and the improved facilities for those studying insects to get into touch with others of similar interests.

The appearance of several elementary works on various branches of the subject, such as the Insect Book, the Butterfly Book and the Moth Book, have acted as a stimulus to direct the attention of students to, and encourage them in the study of entomology. Local Natural History Societies, Horticultural Societies and schools, in all parts of the country, are devoting more time than ever before to the habits of insects, and the observations of their members are being published for the help and encouragement of others. Agricultural journals now include regularly articles upon the insect foes and friends of the farmer. The value of these articles depends entirely upon their scientific accuracy, and there is a constant demand for information on the life histories of insects. Such facts as this information is founded upon, can only be learnt by careful and close personal observation by the trained entomologist. The members of the Entomological Society of Ontario, located in all parts of the Dominion, are collecting assiduously and, in the pages of the *Canadian Entomologist* and of the Annual Reports, are making known their discoveries for the benefit of the whole country.

During the past year, in addition to the constant and important work of many collectors who have not the opportunity to travel from their own home fields of action, several collectors have penetrated to little known fields of work and have brought back many treasures, which in due time will be worked up and reported upon; thus, useful knowledge will be disseminated as to the geographical distribution of species, their life habits, and varying foods in widely separated localities. Of the officers of the Geological Survey Department, Mr. Joseph Keele, collected during the past summer along parts of the Stewart and Pelly Rivers in the far off Yukon. Mr. W. J. Wilson again visited the Hudson Bay slope and was this year along the height of land. Mr. T. P. Reilly, of the Alaska Boundary Survey, and Mr. Douglas H. Nelles, of the same Survey, brought back small collections, the former from near Sixty Mile River, along the 141st meridian in the Yukon, and the latter from Bartlett Bay, off Glacier Bay, Alaska. Mr. Andrew Halkett, Naturalist of the Department of Marine and Fisheries, collected during the last summer

in the Provinces of Saskatchewan, around the Qu'Appelle Lakes, and in Alberta around Beaver Lake, which localities he was visiting to study the local fishes, but found time to collect several interesting insects. Mr. J. B. Wallis, of Winnipeg, collected at Banff, in the Rocky Mountains, and at Peachland, in the Okanagan Valley, B.C., where he made large collections of insects during July and August. Dr. E. M. Walker, of Toronto, spent the summer at the Georgian Bay Biological Station, at Go Home Bay, Ont., where he made interesting observations on aquatic insects. He also took short trips to Nepigon and Fort William, where he made important collections of orthoptera and odonata. In the month of June, Mr. W. D. Kearfott, the well known microlepidopterist, of Montclair, N.J., paid a visit of a few days to Ottawa, where he made large collections at various places in the district. Dr. Henry Skinner, of Philadelphia, also visited Canada and, after addressing our members at the summer meeting in the beginning of July, proceeded with Dr. Fletcher to Nepigon where two days were spent. They then went to Aweme, Man., and had four days collecting with the Messrs. Criddle, after which a long trip was taken in company with Mr. T. N. Willing, along the Canadian Northern Railway; districts visited were, the Goose Lake district west of Saskatoon, Duck Lake, Prince Albert, Kinistino, Radisson, Lloydminster, Edmonton, Calgary, Banff and Laggan. From Laggan Dr. Fletcher went alone to Vancouver Island. Large numbers of insects were collected in all localities mentioned above. Mr. Gibson spent the first three weeks in September at Rostrevor, on Lake Rosseau, Muskoka, and notwithstanding the unfavorable season, collected enough insects to indicate the richness of the locality. Mrs. Nicholl, of Bridgend, South Wales, this year made a third expedition to the Rocky Mountains and British Columbia, for the special purpose of collecting butterflies. In part of her expedition she was accompanied by Mr. F. H. Wolley-Dod, and, on the whole, these trips were very successful. Mr. Dod has kindly provided us with several of Mrs. Nicholl's records in addition to his own, and there is much of the material still to be worked up.

We have again to express our great obligation to the leading specialists in the United States for their constant courtesies in naming material for our Canadian collectors. Dr. Howard, of Washington, with his assistants; Dr. J. B. Smith, of New Brunswick, N.J., Prof. H. F. Wickham, of Iowa City, Mr. W. D. Kearfott, of Montclair, N.J., and Mr. E. P. VanDuzee, of Buffalo, have placed us all under deep obligations to them. Sir George F. Hampson, of the British Museum, has not only sent several copies of his valuable catalogue to those who have contributed specimens to the British Museum, but has also corrected the names of some species which had been standing under wrong names in Canadian collections for some years.

Literature.

Among the many valuable works, reports and separate papers which have dealt with Canadian insects and which have appeared during the past year, special mention may be made of the following:

Busck, August, Revision of the American Moths of the Genus Argyresthia (separate from Proc. U. S. National Museum, Vol. XXXII., pp. 5 to 24, plate IV., V.), Washington, D.C., 1907. In this important pamphlet, Mr. Busck gives a monograph of the American species of these most attractive and beautiful little moths. All the species are figured except three doubtful species which are unknown to the author. Of particular interest to Canadian collectors are *A. conjugella* which is occasionally destructive to apples in British Columbia and *A. thuiella*, which has been noticeably injurious to the

American Arbor-vitæ, or White Cedar, of Eastern Ontario and Western Quebec, for the past three years. With Mr. Busck's excellent paper there should be no trouble in recognizing any species that have been described.

Caudell, Andrew Nelson, The Decticinæ (a group of Orthoptera) of North America, ninety-four figures. (Separate from Proc. U. S. National Museum, Vol. XXXII, pp. 285-410, published May 23, 1907.) An important paper and one which will be of great help to those studying Orthoptera. Mr. Caudell deals in an exhaustive way with a group which has been found very troublesome to students. His opportunities to study a large number of specimens and also of having travelled extensively in the localities where many species occur have given him facilities which few have enjoyed. The figures given are excellent and will be of great assistance to those working at these difficult insects. Several published species have been reduced to synonyms and new genera have been erected, but the work is very thorough and all orthopterists will be grateful to the author for this timely monograph.

Chittenden, F. H., Sc.D., U. S. Department of Agriculture, Insects Injurious to Vegetables. Small 8vo. New York. Orange Judd Co., 262 pp., 163 illustrations. This is a handy little manual treating briefly of the best known insects which attack vegetable crops and giving the remedies usually applied. Preliminary chapters deal with the value of a knowledge of entomology, the classification of insects, practical agriculture and artificial remedies, and apparatus. Not only will this book be of use to gardeners, but it should be a convenient handbook for students and teachers.

Dyar, H. G., Report on the Mosquitoes of the Coast Region of California, with Descriptions of New Species. (Proc. U. S. Nat. Museum, Vol. XXXII, pp. 121-129). Although a paper of only a few pages, this article by Dr. Dyar will be read with much interest by our western dipterists, as it deals with many species which are found in British Columbia and some other parts of Canada. *Anopheles maculipennis* of the West is now *Anopheles occidentalis* D. & K. A majority of the species treated either have been already found in British Columbia or are sure to be discovered as more extensive collections are made. The value of securing the preparatory stages is shown in many instances in the present paper. Anyone having opportunities of rearing the larvæ of mosquitoes should be careful to save the exuviæ and forward them to Dr. Dyar with the specimens for examination, remembering always that a few perfect specimens are of far more value than a large number of broken ones.

Casey, T. L., A Revision of the American Components of the Tenebrionid sub-family Tentyriinæ (Washington Academy of Sciences, Vol. IX, pp. 275-522). October 18, 1907. In this important work Major Casey monographs in a thorough manner and brings up to date all that is known of "that part of the great family Tenebrionidæ, having the abdominal segments unmodified by a coriaceous hind margin and the middle coxæ enclosed externally by the sterna alone, without the intervention of a small piece attached to the coxæ and sometimes separating the sterna, known as the trochantin." This was Leconte and Horn's definition of the subfamily and has been adopted tentatively for the meantime. The author suggests that he may have overstepped the limit of prevailing conservatism in proposing new genera, but the high quality of Major Casey's work during many years has prov d that although it has occasionally been somewhat severely criticised, on account of this very feature, and the great convenience and stability of a large proportion of his differentiations, these are being adopted more and more even by the most conservative. As in the case of his work on Staphylinidæ, noticed last year, much foreign material has been used in making comparison

with American forms. The advantage of this is shown in many places. We trust that Major Casey may at no very distant date treat the other subfamilies of the Tenebrionidæ in the same thorough manner as he has done in this publication.

GILLETTE, C. P., Chermes of Colorado Conifers (Proc. Acad. Nat. Sciences, Philadelphia) January, 1907 (separates issued April 2, 1907), pp. 22, plates 11. This article by Prof. Gillette is the most important contribution towards our knowledge of the spruce gall lice which has yet appeared. It is copiously and beautifully illustrated and the different new species described are dealt with in an exhaustive manner. *Chermes Cooleyi* is the name given to the large and handsome gall found in British Columbia upon the Sitcha Spruce, and the gall, as well as the insect in all its stages of development, are figured and described with great detail. This paper will be welcomed by all homopterists who will be glad to have these different species characterized. In the past nearly all the gall making species of Chermes found on spruce have been called *Chermes abietis*.

HAMPSON, Sir. George F., (Bart.), Catalogue of the Lepidoptera Phalænæ in the British Museum, Vol. VI, Noctuidæ, 1906, pp. 532, plates XCVI to CVII. Sir George Hampson's new volume appeared early in the year and through his kindness and that of the Trustees of the British Museum was presented to several of the members of our Society who had helped by sending good specimens to the British Museum collection. This volume is of particular interest to Canadians from the large proportion of insects belonging to our fauna which are included among the 692 species described. Of the 322 coloured figures given on the plates no less than 141 species have been already taken in Canada or are quite likely to occur within our limits. The range of the present volume is "the Cucullianæ, the third of the fifteen sub-families into which the Noctuidæ are divided. This subfamily is characterized by its trifid neuration of the hind wing combined with spineless tibiæ and smooth eyes surrounded by eyelashes of bristle-like hairs. It forms a group of genera very closely related to the Acronyctinæ, the lowest of the subfamilies of the Noctuidæ Trifinæ." This volume is of great importance to all North American students. From correspondence with Sir George Hampson it is apparent that there are a great many species of North American Noctuidæ, of which good specimens would be most acceptable for the British Museum. It is manifestly to the advantage of everyone to help now by sending specimens to Sir George Hampson, particularly those concerning the identity of which there is any doubt. He will gladly examine and report upon them. It may be noted that Prof. J. B. Smith, who is one of ourselves, is closely in touch with Sir George Hampson and has been of great assistance to him in the volume now referred to.

KEARFOTT, W. D., New North American Tortricidæ; Transactions of the American Entomological Society, Philadelphia, Vol. XXXIII, No. 1, pp. 1 to 98. (Separate signatures mailed as issued between Feb. 2 and March 27, 1907.) In this article 159 species and 4 varieties are described as new, and of these 20 species are from Canada. This valuable contrib tion will be of great value to Canadian students of microlepidoptera, in whose behalf the author has been so untiring in his efforts. Many hundreds of specimens have been submitted to him from collectors in all parts of the country and he has been most generous in naming and returning authoritatively labelled material. Our Ottawa members not only had the great pleasure of meeting Mr. Kearfott when he paid us a short visit last spring but had the privilege of accompanying him to the field, where they got much valuable information as to the best ways of collecting and rearing microlepidoptera. Mr. Kearfott's enthusiasm was an inspiration.

The following is a list of the names and addresses of collectors heard from during 1907.

Anderson, E. M., Provincial Museum, Victoria, B.C.
Albert, Rev. Roger, Maisonneuve, Que.
Baird, Thomas, High River, Alta.
Baldwin, J. W., 74 Besserer Street, Ottawa.
Bédard, Jos., Ste Croix, Que.
Bethune, Rev. Prof., O. A. C., Guelph.
Boulton, A. R. M., c/o King Brothers, Quebec, Que.
Brodie, Dr. W., Provincial Museum, Toronto.
Bryant, Theo., Ladysmith, B.C.
Bush, A. H., 1105 Ninth Ave., Vancouver, B.C.
Chagnon, Gus., Box 186, Montreal.
Cockle, J. W., Kalso, B.C.
Criddle, Norman, Treesbank, Man.
Dawson, Horace, Hymers, Ont.
Denny, Edward, 200 Mitcheson St., Montreal.
Dent, W. A., Sarnia, Ont.
DeWolfe, L. A., Truro, N.S.
Dod, F. H. Wolley, Millarville, Alta.
Evans, J. D., Trenton, Ont.
Fletcher, James, Experimental Farm, Ottawa.
Fyles, Rev. T. W., Levis, Que.
Gibson, Arthur, Experimental Farm, Ottawa.
Hahn, Paul, 433 Indian Road, Toronto.
Halkett, A., Fisheries Museum, Ottawa.
Hanham, A. W., Duncans, B.C.
Harrington, W. H., P.O. Dept., Ottawa.
Harvey, R. V., Victoria, B.C.
Heath, E. F., Cartwright, Man.
Hudson, A. F., Millarville, Alta.
Jarvis, T. D., O. A. C., Guelph, Ont.
Keele, Jos., Geological Survey, Ottawa.
Keen, Rev. J. H., Metlakatla, B.C.
Létourneau, Jos., Exp. Farm, Ottawa.
Lyman, H. H., 74 McTavish Street, Montreal.
Marmont, L. E., 2553 Second Ave. West, Vancouver, B.C.
McIntosh, W., St. John, N.B.,
Metcalfe, W., 288 Bank Street, Ottawa.
Moore, W. H., Scotch Lake, N.B.
Payne, H. G., Granville Ferry, N.S.
Perrin, Jos., McNab's Island, Halifax, N.S.
Russell, John, Digby, N.S.
Sanson, N.B., Banff, Alta.
Saunders, Henry, 21 Harbord St., Toronto.
Sherman, R. S., 2285 Sixth Ave., Vancouver, B.C.
Simpson, W., Dom'n Observatory, Ottawa.
Taylor, Rev. G. W., Wellington, B.C.
Venables, E. P., Vernon, B.C.
Walker, Dr. E. M., 99 St. George St., Toronto.
Wallis, J. B., Machray School, Winnipeg, Man.
Williams, J. B., 125 College St., Toronto.
Willing, T. N., Regina, Sask.
Wilmot, E. S., Vernon, B. C.

Wilson, W. J., Geological Survey, Ottawa.
Winn, A. F., 132 Springfield Ave., Westmount, Que.
Young, C. H., Geological Survey, Ottawa.
Zavitz, E. J., O.A.C., Guelph.

NOTES OF CAPTURES.

Lepidoptera.

(Arranged according to Dyar's List of North American Lepidoptera, U. S. N. M. Bull. No. 52.).

RHOPALOCERA.

(Dyar's number.)

8. *Papilio daunus*, Bdv. Vernon, B.C., (Venables).
11. *Papilio glaucus*, L., a. *turnus*, L. Dr. Henry Skinner, of Philadelphia, took a perfect specimen of the melanic form named *fletcheri* by Kemp, at White River, Ont., on the Canadian Pacific Railway, where it was flying with scores of the ordinary form, around a damp spot below the platform.
14. *Papilio thoas*, L. Several specimens of this southern butterfly were taken in Ontario during the past season; Trenton, Sept. 21, (Evans); Sarnia, Oct. 9, (Dent); Niagara Glen, Sept. 3, (Williams).
16. *Papilio machaon*, L., a *aliaska*, Scudd. Mouth of Campbell Creek, Pelly River, Yukon, July 8, (Keele).
17. *Papilio bairdii*, Edw., a. *oregonia*, Edw. Peachland, B.C., July 27, (Wallis).
38. *Pontia napi*, L., b. *hulda*. Edw. Pelly River, July 13, (Keele).
42. *Synchloe creusa*, D. & H. Laggan, Mount St. Piran, near timber line, July 17, scarce, (Dod); Banff, (Sanson).
62. *Eurymus meadii*, Edw., a. *elis*, Strk. The commonest Colias on the head waters of the Athabasca River, (Mrs. Nicholl).
75. *Eurymus nastes*, Bdv. Near Taku River, Northern British Columbia, August 8, 1906, (Bryant).
128. *Argynnis eurynome*, Edw. c. *artonis*, Edw. Duck Lake, Sask., July 22, (Fletcher).
143. *Brenthis alberta*, Edw. On mountains near the head waters of the Athabasca and Saskatchewan Rivers, fairly swarming in many places, end of July, (Mrs. Nicholl).
144. *Brenthis astarte*, D. & H. On mountains near the headwaters of the Athabasca and Saskatchewan Rivers, end of July (Mrs. Nicholl). Dr. Henry Skinner tells us that 2 specimens were also taken on Mount Athabasca (altitude 7,200 feet) by Mrs. C. Schaeffer, of Philadelphia.
Charidryas hanhami, Fletcher. Treesbank, Man., July 15, several specimens, (Criddle, Fletcher, Skinner).
169. *Cinclidia harrisii*, Scud. Blackburn, Ont., June 28, July 5, (Young) Go Home, Ont. (Walker).
218. *Aglais milberti*, Godt. Scotch Lake, N.B. This species has been observed here since the beginning of October. It is one of the rarest butterflies in this section. (W. H. Moore).

270. *Erebia disa*, Thun., a. *mancinus*, D. & H. Headwaters of Saskatchewan, end of July, (Mrs. Nicholl).

291. *Œneis chryxus*, D. & H., a. *calais*, Scudd. Go Home Bay, Ont., June 16, (Walker). This interesting insect is very little known. The specimens described by Scudder were collected by Drexel from near Rupert House at the south-eastern extremity of Hudson Bay. It has also been taken at Carbonear, Newfoundland. Scudder says "it appears to be confined to the high northern regions of the eastern half of the continent." Its nearest ally is *Œ. chryxus*, a common insect in the main chain of the Rockies.

295. *Œneis norna*, Thun., k. *brucei*, Edw. Banff, Alta., on Sulphur mountain, (Sanson), occuring at from 7,500 to 8,500 feet altitude. Common on all the high mountains at head of Athabasca and Saskatchewan rivers, flying with *beanii*, end of July, (Mrs. Nicholl).

1. *beanii*, Elwes. Banff, on Sulphur mountain at a height of from 7,500 to 8,500 feet. Mount Stephen and Mount Field, B.C., about 7,000 feet, July 7 and 8. I also saw it on a mountain about 12 miles east of Lake Windermere on July 13. About 10 specimens at Mount St. Piran, Laggan, July 16-18, including a female on the summit at about 8,600 feet and another close above Lake Agnes, below timber line, at about 6,800 feet. (Dod.). Summit of Mt. St. Piran, August 4, (Fletcher).

335. *Uranotes melinus* Hbn. Digby, N.S., July 20, (Russell); Peachland, B.C., (Wallis).

383. *Erora læta*, Edw. Meach Lake, Que., June 14, 15, (Young).

409. *Cupido sæpiolus*, Bdv. Female seen ovipositing on the young flower buds of *Hedysarum boreale* at Kinistino, Alta., July 25, (Fletcher).

437. *Rusticus anna*, Edw. Pelly River, below Hoole River, July 5, (Keele).

469. *Pamphila palæmon*, Pallas. Eastman's Springs, Ont., near Ottawa, June 19, several specimens, (Gibson & Young). Only taken once before in the Ottawa district.

488. *Erynnis sassacus*, Harr. Nepigon, July 9, (Fletcher & Skinner); Go Home Bay, Ont., (Walker).

526. *Polites peckius*, Kirby. Banff, July 27, (Sanson).

584. *Epargyreus tityrus*, Fab. Cartwright, Man., June 2, one specimen, a new record for Manitoba, (Heath).

HETEROCERA.

677. *Pholus vitis*, L. McNab's Island, Halifax, N.S., Aug. 29, (Perrin). An immigrant from the South, Mr. Perrin says that his specimen answers well to the figure of *P. fasciatus* as shown on Plate 3 of Holland's Moth Book.

683. *Ampelophaga versicolor*, Harr. Ottawa, August 18, (Baldwin), Montreal, July, specimen taken at Lafontaine Park, collector unknown. record sent by Mr. Winn. The larvæ feed on *Nesæa verticillata* and should be looked for in August.

704. *Sphinx luscitiosa*, Clemens. Tukon River, branch of Megiskan River, July 20, (Wilson).

713. *Sphinx canadensis*, Bdv. Ottawa, July 6, (Baldwin); Quebec, July 3, (Boulton), Montreal, July, (E. C. Barwick).

778. *Basilona imperialis*, Dru. Kingston, Aug. 12, (Klugh). Larva found feeding on red and white pine in Simcoe County, Sept. 15, (Zavitz).

846. *Ecpantheria deflorata*, Fab. Niagara Glen, June 30, (Hahn).

861. *Phragmatobia assimilans*, Wlk., a. *franconica*, Slosson. Montmorency Falls, Que., June 14, and flying in bright sunshine at Lake Beauport, Que., June 23, (Boulton).

869. *Neoarctia yarrowi*, Stretch. Mount Stephen, Field, B.C., July 7, a fresh female at rest on a rock in hot sunshine, alt. 7,000 feet. I took a larva in first moult nearby, and bred a male on July 29, from a full fed larva found on a rock in hot sunshine on the top ridge of Mount Field, on July 8. This was of the ordinary woolly bear type with moderately long hairs, black mixed with dark red. The younger larvæ were less black, and refused all food offered. I also took a half grown larva high up on Mount St. Piran, Laggan, on July 17. All of these specimens were above timber line (Dod.)

874. *Apantesis virgo*, L., a. *citrinaria*, N. & D., Ottawa, Aug. 4, (Baldwin).

958. *Panthea portlandia*, Grt. A female on electric lamp, July 16, Field, B.C., (Dod).

960. *Panthea acronyctoides*, Walker. McNab's Island, Halifax, N.S., (Perrin).

982. *Apatela leporina*, L. Larvæ sent from North Head, N.B., Sept. 26, by Mr. M. R. Tuttle, and from Halifax, N.S., by Mr. C. H. Churchill. This is the first record we have of the species occurring in New Brunswick and Nova Scotia.

999. *Apatela radcliffei*, Harvey. Montreal about end of June, (Denny); Ottawa, mature larva found on apple, Sept. 26, (Létourneau).

1,008. *Apatela funeralis*, Grt. Montreal, June 4 and 21, July 15 and 27, (Denny); Ottawa, June 10, bred from maple, (Young).

1,012. *Apatela vinnula*, Grt. Digby, July 5, Aug. 9, (Russell); Ottawa, (Fletcher).

1,028. *Apatela retardata*, Wlk. St. John's, Que., July 1, (Chagnon); Ottawa, June 12, (Gibson), June 16, (Fletcher); Digby, June 26, (Russell).

1,046. *Apharetra dentata*. Grt. Digby, Aug. 29, (Russell).

1,078. *Hadenella minuscula*, Morr. Digby, Aug. 3, 1906, Sept. 14, 19, 1907, (Russell). In Dr. Smith's list this species appears as *Hadena minuscula*.

1,146. *Hillia algens*, Grt. Hymers, August, (Dawson); Montreal, (Winn).

1,149. *Hadena bridghami*, G. & R., Digby, Aug. 29, Sept. 12, (Russell).
Hadena ferens, Sm. Windermere, B.C., 3 specimens at light, July 11, 12, (Dod). New to British Columbia.
Hadena alberta, Sm. Calgary, a few at light, July 11 to Aug. 18, (Hudson).
Hadena miniota, Sm. Cartwright, one specimen Aug. 22, (Heath).
Hadena enigra, Sm. Calgary, one at light, July 11, (Hudson).
Hadena maida, Dyar. Kalso, Aug. 7 (Cockle); Glacier, B.C., (Mrs. Nicholl, *fide* Hampson, Cat. VI, p. 344).

1,221. *Hadena apamiformis*, Gn. St. Hilaire, Que., July, (Chagnon).

1.252.1. *Hadena semilunata*, Grt. Gleichen, Alta., one on flowers of Western Snowberry, July 22. I have not seen this for years. (Dod.)

1,279. *Hyppa indistincta*, Sm. Laggan, a female at light, July 18. "Agrees with the figure and description. I have the same species from Kalso and consider it distinct from *brunneicrista*." (Dod.).

1,302. *Laphygma frugiperda*, S. & A., and var. a. *obscura*, Riley. Both common at sugar and light throughout September, at Montreal, (Winn & Denny).

1,341. *Oncocnemis atrifasciata*, Morr. Truro, N.S., (DeWolfe).

1,347. *Oncocnemis major*, Grt. Aweme, July 13, (Fletcher).

1,353. *Oncocnemis pudorata*, Sm. Lake Agnes, Laggan, Alta., Hope Pass, B.C., (Mrs. Nicholl, *fide* Hampson, Cat. VI, p. 154).

1,360. *Oncocnemis reginâ*, Sm. Pile of Bones hill, 6 miles north of Regina, Aug. 10, 1886, (Fletcher). See Hampson, Cat. VI, Pl. XCIX., fig. 15.

1,429. *Semiophora youngii*, Sm. Digby, Aug. 9, (Russell).

1,533. *Rhizagrotis lagena*, Grt. Red Deer River, near Gleichen, a few at sugar, July 23 and 24, (Dod).

1,579. *Paragrotis plagigera*, Morr. Calgary, July 30 and Aug. 24, at light, (Dod and Hudson). Not seen for years. This species is erroneously recorded as *olivalis* in my Calgary list. (Dod.)

1,584. *Paragrotis pugionis*, Sm. Calgary, Sept. 7, (Dod.); Aweme, July 13, (Criddle and Fletcher); Beulah, Man., (Dennis); High River, Alta., (Baird).

1,599. *Paragrotis fumalis*, Grt. Rostrevor, Lake Rosseau, Sept. 3. (Gibson).

1,630. *Paragrotis vulpina*, Sm. Calgary, Sept. 23, (Dod).

1,695. *Paragrotis tristicula*, Morr. Windermere, B.C., July 12, at light, (Dod.) New to B.C.; Truro, N.S., (De Wolfe). A totally unexpected locality for this species. (J. B. S.)

1,725. *Paragrotis infusa*, Sm. Calgary, Sept. 2, (Dod). New to Alberta.

Paragrotis criddlei, Sm. Aweme, Aug. 24, '06, (Criddle).

Paragrotis cocklei, Sm. Kaslo, July 27, '04 (Cockle); Peachland, B.C., July 7, (Wallis).

1,732. *Paragrotis nordica*, Sm. Redvers, Sask., Aug. 3, '06 (A. J. Crocker, through A. F. Winn).

1,775. *Mamestra purpurissata*, Grt. var. *crydina*, Dyar. Windermere, B. C., July 10, one specimen. This agrees with specimens from Kaslo, the type locality. Dr. Smith claims that it is clearly a distinct species. (Jour. N.Y. Ent. Soc. XV, 152, Sept. 1907.) (Dod.)

1,825. *Mamestra goodelli*, Grt. St. Hilaire, Aug. 5, (Chagnon). A northern or mountain species, (J. B. S.).

1,840. *Mamestra sutrina*, Grt. Victoria, Aug. 29, (Anderson); Laggan, B.C., July 16, (Dod). Field, B.C., June 6, (Mrs. Nicholl).

Mamestra artesta, Sm. High River, (Baird).

1,890. *Morrisonia confusa*, Hub. Montreal, June 4, (Denny).

1,905. *Xylomiges tabulata*, Grt. Montreal, 1906, (Denny).

1,998. *Orthodes vecors*, Gn. St. Hilaire, Que., July 10, (Chagnon).

2,111. *Xylina thaxteri*, Grt. Truro, Sept. 18. (De Wolfe).

2,120. *Calocampa cineritia*, Grt. Truro, (De Wolfe); Montreal, (Denny); Ottawa, Oct. 17, (Young).

Cucullia indicta, Sm. Calgary, (Dod, *fide* Hampson, VI., p. 70).

2,138. *Copicucullia antipoda*, Strck. Penticton, B.C., (Mrs. Nicholl, *fide* Hampson, VI. p. 11.).

2,152. *Nonagria oblonga*, Grt. Trenton, June 24, (Evans).

2,165. *Gortyna immanis*, Gn. Ottawa, Sept. 14, (Fletcher); Rostrevor Muskoka, Ont., Sept. 8, (Gibson).

2,167. *Gortyna obliqua*, Harvey. Aweme, Aug. 28, (Criddle).

2,171. *Papaipema cerina*, Grt. Aweme, at light, one splendid specimen, Oct. 1, (Criddle).

2,175. *Papaipema harrisii*, Grt. Hymers, larvæ found in stems of *Heracleum lanatum*, imago 2 Sept., (Dawson); Aweme, reared from same food plant, Aug. 23, (Criddle).

Papaipema pterisii, Bird. Last year we recorded under the name of *Papaipema harrisii*, Grt., var., some Ottawa specimens reared from *Pteris aquilina*. Mr. Bird now informs us that this is not a variety of *harrisii* but a new species which he has described under the above name.

Papaipema ærata, Lyman, (not *P. nelita*, Strck.). Bred again for the fourth time from burdock, in the type locality, Montreal, (Lyman).

Papaipema eupatorii, Lyman. Montreal, one specimen bred from *Eupatorium purpureum*, (Lyman).

2,221. *Orthosia ralla*, Montreal, Aug. 24, (Chagnon).

2,288. *Nycterophæta luna*, Morr. Red Deer River, near Gleichen. Three specimens on thistle heads, July 24-26: two asleep after a rain storm, (Dod); Rudy, Sask., July 19, (Willing).

2,361. *Schinia marginata*, Haw. Ottawa, Aug. 25, (Gibson). A new record for the Ottawa district.

2,389. *Dasyspoudæa lucens*, Morr. Aweme, June 21, (Criddle). This is the first Canadian record of this beautiful little moth, which belongs to the Coloradan fauna.

2,395. *Melanoporphyria immortua*, Grt. Redvers, Sask., June 9, 1906, (A.Y. Crocker); Aweme, Man., June 21, (Criddle).

2,406. *Melicleptria sueta*, Grt. Vernon, (Venables).

2,420. *Heliaca diminutiva*, Grt. Red Deer River, near Gleichen, July 25 and 26, not common, (Dod).

2,423. *Heliaca nexilis*, Morr. Laggan, Mt. St. Piran, at about 7,000 feet, not rare, July 16-18, (Dod). Wilson Pass, near head of Saskatchewan River, July 22, (Mrs. Nicholl); Banff, (Fletcher, Sanson).

2,472. *Polychrysia moneta*, Fab., a. *esmeralda*, Oberthur. Calgary, July 30 and Aug. 13, (Dod).

2,528. *Autographa Sackeni*, Grote. Brazeau Creek, Rockies, Aug. 3, one specimen, (Mrs. Nicholl).

2,477. *Autographa metallica*, Grt. Duncans, B.C., 2 specimens, (Hanham).

2,487. *Autographa rogationis*, Gn. Toronto, May 3, 1897, Ottawa, (Gibson).

2,504. *Autographa v-alba*, Ottol. Kalso, (Cockle). *Teste* Ottolengui.

2,524. *Autographa corrusca*, Strk. Duncans, occasional, on the wing, July, Aug. and Sept., (Hanham).

2,532. *Syngrapha parilis*, Hub. Mt. Saskatchewan (7,500 feet), July 27, rather common (Mrs. Nicholl). This is the species figured by Ottolengui as *parilis* but by Holland as *devergens*, (Dod).

2,535. *Syngrapha devergens*, Hub. Wilcox Pass, Rockies, Alta., July 26, (Mrs. Nicholl *per* Dod).

2,696. *Fruva tortricina*, Zell. Calgary, one at light, July 30, (Dod).

2,769. *Melipotis limbolaris*, Geyer. Digby, July 28, (Russell).

2,836. *Catocala luciana*, Hy. Edw. Cartwright, at sugar, Sept., (Heath).

2,846. *Catocala pura*, Hulst. Cartwright, at sugar, Sept. 10, (Heath).

2,893. *Catocala pretiosa*, Lint. Cartwright, Sept. 10, (Heath).

2,953. *Strenoloma lunilinea*, Grt. Granville Ferry, N.S., (Payne). First Canadian record.

2,983. *Ypsia undularis*, Dru., *a. æruginosa*, Gn. Digby, June 6, (Russell).

3,036. *Philometra metonalis*, Wlk. Windermere, B.C., July 10-12, not rare, new to B.C., (Dod).
3,063. *Lomanaltes eductalis*, Wlk. Digby, June 24, (Russell).
3,117. *Notodonta simplaria*, Graef. Aweme, July 4, Aug. 9, (Criddle).
3,140. *Heterocampa biundata*, Wlk. Truro, July 24, (De Wolfe).
3,142. *Heterocampa bilineata*, Pack. Aweme, June 17, (Criddle).
3,145. *Ianassa lignicolor*, Wlk. Quebec, Aug. 15, (Boulton).
3,353. *Eustroma nubilata*, Pack. Digby, N.S., (Russell). A western moth, which I am rather surprised to see from Nova Scotia. (G. W.T.)
3,387. *Hydriomena sordidata*, Fab., c. *quinquefasciata*, Pack. Skagway District, northern B.C., (White-Fraser & Smith).
3,395. *Hydriomena contracta*, Pack. Ottawa, Sept. 10, (Fletcher); Rostrevor, Muskoka, Sept. 15, (Gibson); Digby, Aug. 16, (Russell). [This name should be *H. contractata*, Pack. (G.W.T.)].
3,449. *Petrophora incursata*, Hbn. Field and Emerald Lake, B.C., July 2-7; Laggan, July 18, up to 6,500 feet, (Dod); Crown Mountain, Vancouver, July 9, (Harvey).
Petrophora fossaria, Taylor. Lake Agnes, Laggan, July 18, (Dod).
3,620. *Deilinea borealis*, Hulst. Banff, June 24, a pair, (Mrs. Nicholl).
3,734. *Cymatophora denticulodes*, Hulst. Calgary, one male at light, Aug. 3, (Dod).
3,743. *Anthelia taylorata*, Hulst. Vancouver, May 8, (Harvey).
3,873. *Nacophora quernaria*, S. & A. McNab's Island, Halifax, emerged March 23, (Perrin).
3,878. *Jubarella danbyi*, Hulst. Vancouver, one at light, April 13, (Sherman).
3,933. *Plagodis approximaria*, Dyar. Kalso, May 3, (Cockle).
3,954. *Euchlæna serrata*, Dru. Trenton, July 12, not taken here before, (Evans).
4,000. *Marmarea occidentalis*, Hulst.. Vancouver, July 1, (Harvey); Duncans, B.C., at light, July, a much larger species than *Azelina ancetaria*, flying a week or two earlier, (Hanham).
4,040. *Leucobrephos brephoides*, Wlk. Mentioned in previous records as *middendorfi;* see Dr. Smith's article, Can. Ent. Nov. 1907. Three specimens, Mayo River, Yukon Territory, April 16, 1907, (J. A. Davidson, through Mr. J. Keele). These were of a very dark form similar to two specimens taken by Dr. A. P. Low, on the portage at Grand Falls, Hamilton River, Labrador, May 12, 1894.
4,106. *Tortricidia testacea*, Pack. Duncans, three specimens at light, in July. Not previously reported from Vancouver Island, Hanham).
4,409. *Phlyctœnia acutella*, Wlk. Toronto, (Metcalfe); Ottawa, (Young).
4,514. *Pyralis costiferalis*, Wlk. Trenton, one specimen, July 22, (Evans).
4.583. *Crambus myellus*, Hbn. Vernon, (Venables).
4,977. *Pterophorus kellicottii*, Fish. Ottawa, (Young).
Exartema merrickanum, Kearf. Rouville, Que., July 5, (Chagnon); Ottawa, (Young).
5,033. *Olethreutes capreana*, Hbn. Sudbury, (Evans).
Olethreutes wellingtoneana, Kearf. Wellington, B.C., May 19, (Taylor).
Olethreutes removana, Kearf. Aweme, Aug. 16, (Criddle).
Olethreutes provana, Kearf. Wellington, April, (Taylor).
Olethreutes galaxana, Kearf. Vernon, April 13—May 13, (Venables).

Olethreutes glitranana, Kearf. Aweme, June 29, (Criddle); Regina, July 2, (Willing); Winnipeg, (Hanham).
Olethreutes coronana, Kearf. Aweme, July 9, (Criddle); Beulah, Man., Aug. 15, (A. J. Dennis).
Eucosma fuscana, Kearf. Rounthwaite, Man., July, (L. E. Marmont).
Eucosma tomonana, Kearf. Westmount, Que., (Winn).
Eucosma johnsonana, Kearf. Victoria, (Taylor).
Eucosma hohana, Kearf. Mount St. Piran, Alta., Aug. 17, (Dr. W. Barnes).
Eucosma heathiana, Kearf. Cartwright, (Heath).
Eucosma solandriana, Hbn. Montreal, June 22, (Winn); Ottawa, (Young).
Eucosma madderana, Kearf. Rounthwaite, July (Marmont); Regina, (Willing).
Thiodia awemeana, Kearf. Aweme, May 20 to June 29, (Criddle); Beulah, (Dennis).
Thiodia asphodelana, Kearf. Calgary, head of Pine Creek, July 2, (Dod).
5,200. *Thiodia montanana*, Wlsm. Aweme, Aug. 25, (Fletcher).
Thiodia timidella, Clem. Montreal, June 9, (Chagnon).
Proteopteryx marmontana, Kearf. Rounthwaite, June 11, (Marmont); Aweme, July 12-24, (Criddle); Prince Albert, Sask., July 19, (Criddle); Regina, July 15, (Fletcher).
Proteopteryx criddleana, Kearf. Aweme, July 24, Aug. 13, (Criddle); Rounthwaite, July, (Marmont).
Proteoteras torontana, Kearf. Toronto, June 5, (Gibson).
Epinotia watchungana, Kearf. Aylmer, Que., June 8, (Gibson);
Epinotia plumbolineana, Kearf. Wellington, June, (Taylor and Bryant).
Epinotia normanana, Kearf. Aweme, June 27, (Criddle).
Enarmonia prosperana, Kearf. Vernon, (Venables).
Enarmonia vancouverana, Kearf. Wellington, June, (Bryant).
Enarmonia youngana, Kearf. Ottawa, (Young).
Enarmonia cockleana, Kearf. Ottawa, (Young).
Enarmonia saundersana, Kearf. Toronto, May 24, to June 11, (Saunders).
5,276. *Enarmonia americana*, Wlsm. Ottawa, June 11, (Gibson).
5,314. *Acleris nivisellana*, Wlsm. Rostrevor, Muskoka, Sept. 7, (Gibson).
Epagoge lycopodiana, Kearf. Ottawa, (Young).
5,353. *Sparganothis flavibasana*, Fern. Ottawa(larvæ common on cultivated Honeysuckle (*Lonicera Japonica*), June 19, moths emerged July 2 to 6, (Kearfott and Gibson).
Hysterosia tiscana, Kearf. St. Hilaire, July 7, (Winn).
Hysterosia cartwrightiana, Kearf. Cartwright, (Heath).
Carposina ottawana, Kearf. Ottawa, (Young).
Kearfottia albifasciella, Fern. Ottawa, (Young).
5,524. *Choreutis silphiella*, Grt. Vernon, (Venables).
Recurvaria gibsonella, Kearf. Ottawa and Hull, Que., moths emerged June 29 to July 6, (Gibson).
Recurvaria coniferella, Kearf. Ottawa, June 20, (Gibson).
Trichotaphe levisella, Fyles. Levis, Que., (Fyles).
Gelechia fondella, Busck. Aweme, May 30 to June 20, (Criddle); Beulah, (Dennis), Rounthwaite, (Marmont).

5,834. *Stenoma schlægeri*, Zell. Truro, July 17, (De Wolfe).
5,876. *Depressaria sabulella*, Wlsm. Ottawa, in house, April 16, (Gibson).
5,879. *Depressaria lythrella*, Wlsm. Rostrevor, Muskoka, Sept. 7, (Gibson).
Mompha claudella, Kearf. Rounthwaite, July 11, (Marmont).
6,265. *Lithocolletis ostensackenella*, Fitch. Trenton, May 11, (Evans).
Incurvaria taylorella, Kearf. Wellington, (Taylor).
Monopis monachella, Hbn. Aweme, Aug. 25, (Fletcher); St. Hilaire, July 7, (Winn); Rouville, Que., July 5, (Chagnon).
6,531. *Tinea arcella*, Fab. Montreal, June 21, (Winn).

Coleoptera.

(Arranged according to Henshaw's List of the Coleoptera of America, North of Mexico.)

30*a*. *Cicindela limbata*, Say. Rudy, July 19; Radisson, Sask., July 29, (Fletcher, Willing, Skinner).
35. *Cicindela hirticollis*, Say. Rudy, Sask., July 19, (Fletcher).
35. *Cicindela vinctipennis*, Lec. Running on high dry prairie among the grass, Rudy, July 19, (Willing).
116. *Carabus mœander*, Fisch. Kinloss, Ont., July 16, '98, (per W. Brodie).
188. *Nebria metallica*, Fisch, var. Metlakatla, B.C., (Keen).
645. *Amara fulvipes*, Putz. One specimen from Glen Ross, Hastings Co., May 10, 1902, not previously recorded from Canada, (Evans).
728. *Dicælus teter*, Bon. North Bruce Co., Ont., (per W. Brodie).
788. *Platynus tenuis*, Lec. Trenton, June, 19, Aug. 11, never taken here before, (Evans).
803. *Platynus ferreus*, Hald. North Bruce Co., (per W. Brodie).
1,057. *Piosoma setosum*, Lec. Rudy, July 20, (Fletcher).
1,477. *Hydaticus stagnalis*, Fab. Ottawa in moss (Dr. H. M. Ami). Mr. Harrington has only twice found the species.
1,487. *Dytiscus circumcinctus*, Ahr. Reference was made in last year's *Entomological Record* to large numbers of this beetle having been taken at electric lights in Winnipeg during the month of October. On Oct. 4 of the present year, Mr. Evans again collected in Winnipeg, over one hundred specimens in the same manner, and about the same time, Mr. T. N. Willing records that enormous numbers of the same species appeared in Regina when his two boys collected for him a pickle jar full and then stopped.
1,791. *Cyrtusa blandissima*, Lec. Aweme, Man., June and July; burrowing in the sand in company with *Ochodæus simplex* and *Bolboceras lazarus*. Found in the burrows made by the larger species, (Criddle).
1,881. *Tychus cognatus*, Lec. Metlakatla, (Keen).
Batrisus zepharinus, Casey. Metlakatla, (Keen).
3,062. *Coccinella tricuspis*, Kirby. Peachland, B.C., (Wallis).
3,095*a*. *Brachyacantha albifrons*, Say. Aweme July 11, (Criddle).
3,148. *Scymnus collaris*, Melsh. Aweme, July 14, (Criddle).
3,734. *Pocadius helvolus*, Er. Reared from a *Lycoperdon*, Grand Forks, B.C., Aug., 1904, (Fletcher).
4,093. *Alaus oculatus*, L. Vernon, July 8, (Wilmot).
4,369. *Limonius subauratus*, Lec. Vancouver, May 4, (Harvey).
4,382. *Pityobius anguinus*, Lec. Granville Ferry, N.S., (Payne).

4,589. *Dicerca pectorosa*, Lec. Kaslo, June 25, (Cockle).

4,594. *Pœcilonota cyanipes*, Say, Radisson, July 29, on *Populus tremuloides* and *P. balsamifera*, common, (Fletcher, Willing, Skinner).

4,600. *Buprestis confluens*, Say. Makinak, Man., (per G. Chagnon); Aweme, July 16, Aug. 9, rare, (Criddle).

4,729. *Agrilus granulatus*, Say. Makinak, Man., (per G. Chagnon).

4,779. *Celetes basalis*, Lec. Aweme, July 5 and 9, rare, (Criddle).

4,913. *Silis spinigera*, Lec. Kaslo, June 2, (Cockle).

5,027. *Malachius thevenetii*, Horn. Kaslo, June 5, (Cockle).

5,110. *Dolichosoma foveicolle*, Kirby. Aweme, July 9, (Criddle).

5,380. *Priacma serrata*, Lec. Kaslo, May 15, (Cockle). Mr. Cockle took a fine pair of this rare beetle at Kaslo. We know of no other Canadian captures. It was described by Dr. J. L. Leconte in 1861 from "East of Fort Colville at Sinyak Water depot and at Camp Kootenay." Dr. Leconte notes the variation in the size of this remarkable species, length .43 to .82 inch.

5,579. *Ochodæus simplex*, Lec. Aweme, burrowing in sand, July 4-13, (Criddle).

5,591. *Bolboceras lazarus*, Fab. Aweme, July 19, (Criddle).

5,594. *Odontæus obesus*, Lec. Aweme, Sept. 2 and 7, in hole in ground, (Criddle); Rudy, July 19, (Henry Skinner).

5,822. *Polyphylla decemlineata*, Say. Rudy, July 19, (Willing).

5,948. *Spondylis upiformis*, Mann. North Bruce County, May 17, '87, (per W. Brodie); Bear Canyon, B.C., May 30, '85, (per W. Brodie); Banff, (Sanson).

5,986. *Gonocallus collaris*, Kirby. Illecillewaet, B.C., May 1, '85, (per W. Brodie).

6,049 *Romaleum simplicicolle*, Hald. Port Sydney, Ont., August, 1890, (Brodie).

6,181. *Xylotrechus quadrimaculatus*, Hald. Ridgeway, Ont., July 28, emerging from branches of Sugar Maple, (Zavitz); Ste. Croix, Que., (Bédard).

6,222. *Desmocerus auripennis* Chev. Glacier, B.C., Aug. 26, (Fletcher).

6,233. *Centrodera decolorata*, Harr. Port Sydney, August, (Brodie).

6,248. *Pachyta liturata*, Kirby. Sulphur Mountain, Banff, Alta., July 30, a black variety, (Sanson).

6,268. *Acmæops vincta*, Lec. Kaslo, May 14, (Cockle).

6,398. *Goes debilis*, Lec. North Bay, June 3, (Brodie).

6,478. *Saperda calcarata*, Say. Peachland, B.C. July, (Wallis).

6,480. *Saperda candida*, Fab. Scotch Lake, N.B., (W.H. Moore); St. John, N.B., (J. Gordon Leavitt). This beetle seems to be very much rarer in the Maritime Provinces than it is in Ontario and Quebec.

6,514. *Tetraopes quinquemaculatus*, Hald. Aweme, July 25, (Criddle).

6,523. *Donacia pubicollis*, Suffr. Qu'Appelle Lakes, July, (Halkett).

6,628*a*. *Cryptocephalus ornatus*, Fab. Aweme, July 10, (Criddle).

6,628*c*. *Cryptocephalus cinctipennis*, Rand. Aweme, July 17, (Criddle).

6,742. *Chrysochus cobaltinus*, Lec. Nelson, B.C., August 19, abundant on *Apocynum androsæmifolium*, (Fitzroy Kelly).

6,781. *Entomoscelis adonidis*, Fab. Near Sixty-one mile River (141 Meridian), Yukon, (T. P. Reilly). The farthest record north we have of the species.

6,795. *Chrysomela exclamationis*, Fab. Aweme, Sept. 6, (Criddle).

6,810. *Chrysomela multipunctata*, Say. This fine species was extremely abundant on willows along the Saskatchewan River at Rudy on July 19, (Fletcher and Willing).

6,827. *Plagiodera oviformis*, Lec. Aweme, June 20, (Criddle).

7,396. *Cœlocnemis dilaticollis*, Mann. Vernon, under logs, June, (Venables); Banff, (Sanson); Peachland, (Wallis).

7,994. *Dendroides canadensis*, Lat. Trenton, June 17 to Aug. 8, five specimens. I have not taken this species for many years, (Evans). Two specimens were brought back from the Skagway District in Northern British Columbia, by G. White-Fraser and R. Smith.

8,134. *Cantharis viridana*, Lec. Rudy, July 20, (Fletcher).

8,271. *Amnesia ursina*, Horn. On raspberries, destructive to the buds, Vernon, B.C., (Venables); Victoria B.C. (Taylor).

8,331. *Evotus naso*, Lec. Rudy, on willows, July 20, (Fletcher); Kelowna, B.C., on apple, (F. J. Watson).

8,427. *Phytonomus punctatus*, Fab. Harrison, B.C., August, (Wilmot). The Clover Leaf Weevil was found on Vancouver Island for the first time in 1902, by Mr. Hanham. Mr. Wilmot's record shows that it has now worked its way up the Fraser valley as far as Harrison.

8,482. *Hypomolyx pineti*, Fab. Skagway District of Northern British Columbia, (White-Fraser and Smith).

8,498. *Lixus concavus*, Say. Ottawa, September, three specimens found on *Polygonum pennsylvanicum*, (Young). This is the Rhubarb Weevil which in some parts of the United States has sometimes given trouble, but is rare in Canada. This is the first time the species has been recorded from the Ottawa District.

8,607. *Otidocephalus chevrolatii*, Horn. Meach Lake, Aug. 1, (Young).

8,676. *Orchestes rufipes*, Lec. This rare little weevil was very abundant and destructive to willows at Ottawa in Sept., the larvæ mining in the leaves and the mature beetles eating out the surface in a similar way to flea-beetles, (Fletcher).

9,667. *Amblopusa brevipes*, Casey, var. Metlakatla, (Keen).

10,767. *Nocheles vestitus*, Casey. Kelowna, injuring buds of Apple, May, 1892, (F. J. Watson).

Nocheles torpidus, Lec. New Denver, B.C., June 14, (W. D. Mitchell); Grand Forks, B.C., June 6, (M. Miller).

Hymenoptera.

Work among the hymenoptera seems to have lagged behind a good deal during the last three years. This is much to be regretted, owing to the great importance of these insects. Moreover, the difficulty in separating the genera and species is sometimes so great that it alone should serve as a stimulus to those who are looking for a specialty in which they may do good work. A few records have been received, which it is well to include here. A collection of *Bombi* has been sent to Mr. H. J. Franklin, of Amherst, Mass., who is making a specialty of these insects, and who has kindly furnished the names of a few of the more interesting which are here given as a beginning. It is to be hoped that these will be largely added to in succeeding years. The wasps and bees present excellent fields for special work.

Zarœa inflata, Nort. Trenton, reared from larvæ feeding upon a shrub in my garden last year; more larvæ were found this year, (Evans).

Labidia opinus, Cress. Kaslo, Aug. 11, (Cockle).

Pamphilius ruficeps, Hargtn. Toronto, July 30, '88, (Metcalfe); Ottawa, May 31, (Harrington); Maisonneuve, near Montreal, Que., (Albert). This handsome sawfly seems to be rare. Another specimen was taken in Montreal some years ago by Rev. C. J. Ouellet.

Oryssus occidentalis, Cress. Peachland, B.C., July, (Wallis).

Diastrophus cuscutæformis, O.S. Guelph, in galls on stems of *Rubus villosus*, (Jarvis).

Diastrophus potentillæ, Bass. Perth, in round galls on stems of *Potentilla canadensis*, (Jarvis). Youghall, N.B., July, (Fletcher).

Diastrophus turgidus, Bass. Guelph, on stems of *Rubus strigosus*, (Jarvis).

Andricus punctatus, Bass. Guelph, on stem of *Quercus coccinea*, (Jarvis).

Andricus seminator, Harr. London, Ont., from galls on *Quercus alba*, (J. Dearness).

Andricus topiarius, Ashm. Guelph, leaf galls of *Quercus macrocarpa*, (Jarvis).

Biorhiza forticornis, Walsh. Gravenhurst, Ont., galls on *Quercus alba*, (Jarvis); very abundant on young shoots of *Quercus macrocarpa*, Rivers, Man., (Fletcher).

Pristaulacus melleus, Cress. Kaslo, June 3-30, (Cockle).

Ichneumon caliginosus, Cress. Kaslo, bred from pupa of *Grapta satyrus* found at Montezuma mine, South fork of Kaslo Creek, B.C., emerged Sept. 7, (Fletcher). Mr. Harrington has taken several specimens of this widely distributed species at Ottawa.

Ichneumon milvus, Cress. Ottawa, Aug, 22, (Harrington). Meach Lake, Sept. 1, (Fletcher). One of our rarest ichneumons.

Trogus brullei, Cress. Maisonneuve, near Montreal, (Albert).

Trogus fulvipes, Cress. Kaslo, ex pupa of *Papilio eurymedon*, May, (Cockle); ex pupa of *P. turnus*, Digby, Oct. 2, (Russell); Aweme, July 14, (Fletcher).

Trogus fletcheri, Hargtn. Bred from pupa of *Papilio eurymedon*, Wellington, B.C., (Taylor).

Cryptus proximus, Cress. Kaslo, May, (Cockle).

Ephialtes occidentalis, Cress. Kaslo, July 20, (Cockle).

Ephialtes variatipes, Prov. Kaslo, July 4, (Cockle); Ottawa, (J. A. Guignard).

Rhyssa persuasoria, L. Millie Lake, near height of land, Hudson Bay Slope, July 26, (Wilson).

Thalessa nortoni, Cress. Hymers, (Dawson). Metlakatla, B.C., (Keen).

Lampronota marginata, Prov. Levis, Que., reared from *Trichotaphe levisella*, (Fyles).

Spilochalcis (Chalcis) *encausta*, Cress. Aweme, three specimens of this beautiful and grotesque little insect were taken by Mr. Evelyn Criddle, July 17.

Masaris marginalis, Cress. Kaslo, June 2, (Cockle). This is the first specimen of this genus to be recorded from Canada. It is a slender wasp-like insect but has clubbed antennæ.

Bombus borealis, Kirby. Nepigon, Ont., July 1, '88, Ottawa, Aug. 27, '02, (Fletcher).

Bombus californicus, Smith. Prince Albert, July 6, 1900, an extreme variation; Calgary, July 17, nearly typical, (Fletcher).

Bombus fervidus, Fab. McLeod, Alta., June 20, (Fletcher).

Bombus huntii, Greene. McLeod, June 20, (Fletcher).

Bombus impatiens, Cress. Ottawa, Oct. 2, '02, (Fletcher).

Bombus kirbyellus, Curtis. Fullerton, Hudson Bay, July, 1904, (Halkett); Mount Edith, Banff, July 7, '02, (Fletcher.)
Bombus melanopygus, Mylander. Mount Edith, Banff, July 7, '02, (Fletcher).
Bombus nevadensis, Cress. Vernon, June, (Venables); McLeod, Alta., June 20, '02, (Fletcher and Willing); High River, Alta., a magnificent melanic specimen, the whole body uniformly black, (Baird).
Bombus occidentalis, Greene. Banff. Aug. 28, (Sanson).
Bombus pennsylvanicus, De Geer. Ottawa, (Fletcher).
Bombus perplexus, Meach Lake, July 20, '05, (Gibson).
Bombus sylvicola, Kirby. Fullerton, June 20, '04, (Halkett).
Bombus ternarius, Say. Prince Albert, July 6, '00, (Fletcher).
Bombus terricola, Kirby. Kebinakagami River, near height of land, Hudson Bay slope, Aug. 2, '03, (Wilson).
Bombus vagans, Smith. Nepigon, July 1, '88.; Ottawa, Aug. 25, May 5, (Fletcher).
Psithyrus interruptus, Greene. Mount Edith, Banff, July 7, 02, (Fletcher).
Psithyrus laboriosus, Fab. Ottawa, April 26, 01, (Fletcher).

Hemiptera.

Several additions have been made during the past summer to the collections of Canadian hemiptera, most of them to the sub-order homoptera. Unfortunately, few of the records have been sent in with sufficient data to warrant their inclusion here. Useful notes on these insects, as with all others, give the date of capture, the locality, and, when possible, the nature of the food. The following list from Mr. J. D. Evans, of Trenton, is the most complete and is submitted because many of the insects mentioned are new to the Canadian list. Mr. Van Duzee, who kindly identified the material, considers their capture worthy of being put on record.

Helicoptera septentrionalis, Prov. Sudbury, June 6.
Helicoptera opaca, Say. Co. Hastings.
Heliria strombergi, Godg. Sudbury, Aug. 8, 1889.
Cyrtolobus discoidalis, Emm. Belleville.
Cyrtolobus trilineatus, Say. Belleville.
Telamona Westcotti, Godg. Belleville.
Telamona decorata, Ball. Belleville.
Telamona compacta, Ball. Halifax, N. S., June, 1897.
Scaphoideus lobatus, Van D. Trenton, Sept. 3, '01.
Athysanus osborni, Van D. Trenton, Aug. 15, '01.
Thamnotettix belli, Uhler. Trenton, June 6, '01.
Xestocephalus fulvocapitatus, Van D. Trenton, Aug. 29, '01.
Aphrophora Signoreti, Fitch. Co. Hastings.
Gypona cinera, Uhler. N.W. Terr.
Pediopsis canadensis, Van D. Co. Hastings, June 27, '03.
Bythoscopus sobrius, Walker. Sudbury, 1892.

Mr. T. D. Jarvis, of Guelph, in connection with his studies of vegetable galls and scale insects has found the following species, which are of interest from the localities where found.

Pseudococcus trifolii, Forbes. On roots of white clover at Collingwood.
Chionaspis salicis, L. Guelph, on leatherwood (*Dirca palustris*).

Aspidiotus æsculi, Johnson. On basswood (*Tilia americana*), Toronto, Brantford, Guelph.

Aspidiotus diffinis, Newst. Guilds, Ont., on *Tilia americana.*

Aspidiotus osborni, Newell & Ckll. Toronto, on *Quercus alba;* Guelph, on *Betula lutea.*

Aspidiotus ulmi, Johnson. On *Ulmus americana*, Guelph, Toronto.

Kermes pubescens, Bogue. On *Quercus alba*, Perth, Toronto, Guelph and Brantford.

Aleyrodes asarumis, Schimer. On *Asarum canadense*, Guelph and London.

Aleyrodes forbesi, Ashm. On *Acer saccharinun*, Guelph.

Mr. W. Metcalfe, of Ottawa, sends the following as the most interesting species he has added to his collection this year:

Ceresa constans, Walk. Hull, Que., very local, but abundant on three special basswood trees. A distinct and readily recognized species.

Pediopsis bifasciata, Van Duzee. Mer Bleue, Ottawa, an Aspen Poplar June. A good species distinct from *trimaculata*, Fitch.

Peltonotellus histrionicus, Stal. Mer Bleue, Ottawa, August. The rare macropterous form of this nearly always wingless species.

Clastoptera proteus, Fitch, subsp. *nigra*, Ball. Mer Bleue, Aug. New to the Ottawa district. (Metcalfe.)

Emesa longipes, DeG. Several specimens of this remarkable bug were found by Mr. W. A. Dent, at Sarnia, Ont., in the first week of October. These are the first specimens which we know of as having been found in Canada. It is an extremely slender species with very long slender legs, the anterior pair of which are modified for grasping. They are called Thread-legged Bugs and are predaceous in their habits. Superficially, they resemble minute walkingstick insects but can of course be seen to be different by their mouth parts and from having wings.

Orthoptera.

Large collections of orthoptera have been made in various parts of Canada during the past two years and many interesting species have been taken. The lists are not as yet complete but some of the more interesting have already been reported on. Most of these specimens have been identified through the kindness of Dr. E. M. Walker, who has also himself collected assiduously. His discoveries have been of so much interest that he purposes at an early date to prepare special papers upon them for the *Canadian Entomologist.* The following captures are worthy of mention:

Mecostethus gracilis, Scudd. On swampy prairie, Radisson, Sask., July 29, (Fletcher).

Aulocara elliotii, Thom. Vernon, B.C., July 26, '95 (Fletcher). The first Canadian record.

Arphia teporata, Scudd. Banff, July 12, '02, (Sanson). New to Canada.

Arphia frigida, Scudd. Aweme, June 21, (Criddle); Radisson, July 29; Rudy, Sask. Red-winged, no yellow costal stripe, July 19, (Fletcher.)

Trimerotropis vinculata, Scudd. Ashcroft, B.C., June 5, (Rev. W. M. Roger). Victoria, (Taylor).

Trimerotropis agrestis, McNeill. Aweme, Aug. 14, (Criddle). New to Canada. This elegant little locust has been taken by the Messrs. Criddle on the sand hills near the Douglas swamp, Manitoba, for many years. In coloration it is exactly like the sand upon which it settles.

Melanoplus altitudinum, Scudd. Fort William, Ont., Aug. 27, Nepigon, Aug. 29. One of the females from Nepigon is a long-winged form. (Walker). New to Canada.

Melanoplus extremus, Walk. A few specimens of the short-winged form were taken in a floating cranberry bog at Go Home, Ont., July to August, 1907. It was common at Fort William where both forms were represented, (Walker); Beaver Lake, Alta., Long-winged, (Halkett).

Melanoplus validus, Scudd. Nelson, B.C., Sept. 30, 1906, (Prof. W. J. Alexander). New to Canada.

Amblycorypha oblongifolia, De G. A beautiful specimen of the pink form of this Katydid was exhibited by Dr. Bethune at the annual meeting of the Entomological Society of Ontario. It was collected at Colchester, South, in Essex Co., Ont., Sept. 30. This form is well shown in *Entomological News* for May, 1901. In *Science* for Nov. 8, 1907, is a note on Pink Katydids and other insects by Mr. J. A. Grossbeck.

Anabrus longipes, Caud. Nelson, Sept. 30, 1906, (Prof. Alexander). New to Canada.

Platycleis fletcheri, Caud. "Four males of this rare insect, hitherto only known by the single female from Calgary, were taken at Fort William. This was one of the dimorphic forms I found in this interesting locality and the only one of that nature known among the Decticinæ. The species is interesting as being of a European type; the genus is a common one in Europe, but is the only one of the *Decticinæ* represented in North America," (Walker); Millarville, Alta., Aug., 1906, 2 short winged males (Dod); Mr. Dod's specimens were taken at about 10 miles from where the type specimen was collected. Although recorded as from Calgary the specimen was actually taken between Midnapore and Millarville, and about 10 miles south of Calgary.

Pezotettix borealis, Scudd. Windy Lake, on C.P.R., near Sudbury, Ont., Oct. 4, three specimens on *Comptonia asplenifolia*, (Fletcher).

Asemoplus nudus, E. Walk. Banff, Alta., (Sanson).

Cyphoderris monstrosa, Uhl. Peachland, B.C., (Wallis). The only previous Canadian record for this rare and grotesque insect was Banff, Alta., where a few specimens have been taken by Mr. Sanson. During the past summer Mr. Wallis collected a pair at Peachland on Okanagan Lake, B.C.

Odonata.

Owing to the encouragement given by Dr. E. M. Walker, of Toronto, several of our collectors have sent in specimens of dragonflies, many of which have already been examined by Dr. Walker. He has provided the following list of species which he considers of more than usual interest to Canadian entomologists:

Lestes disjunctus, Selys. Ottawa, (Létourneau). Metlakatla, Aug. 4, '04. Massett, Q.C.I., (Keen).

Lestes inæqualis, Walsh. Go Home Bay, Ont. One pair from cranberry bog on margin of small lake, July 3, (Walker). New to Canada.

Lestes unguicutalus, Hag. Ottawa, July 16, (Gibson, Létourneau).

Argia violacea, Hag. Hull and Meach Lake, Q., July 13, 21, (Gibson).

Ischnura verticalis, Say. Orange form, Hull, Q., July 17, (Létourneau), Pruinose black form, Hull, July 13, (Gibson).
Nehalennia gracilis, Morse. Go Home Bay. Abundant on sphagnum bogs on the margins of small lakes, (Walker). New to Canada.
Enallagma ebrium, Hag. Ottawa, June 7, July 2, (Gibson).
Enallagma calverti, Morse. Laggan, Alta., 1890, (T. E. Bean).
Enallagma cyathigerum, Charp. One male, Pittsburg Camp, Georgian Bay, June 21, (Walker). New to Ontario.
Enallagma minusculum, Morse. Scotch Lake, N.B., July 7, (W. H. Moore). New to Canada.
Gomphus fraternus, Say. Victoria Harbour, Georgian Bay, July, (A. G. Huntsman).
Boyeria grafiana, Williamson. Nagagami River, Hudson Bay slope, 15 miles up, (Wilson).
Boyeria vinosa, Say. Kenogami River, July 16, '04, (Wilson).
Æschna clepsydra, Say. Ottawa, July 8, (Gibson).
Æschna sitchensis, Hag. Levis, (Fyles). Burroughs Bay, Alaska, Aug. 5, 1894, (J. A. Cadenhead). A rare species recorded also from Newfoundland, *Ent. News*, Apl., 1906, p. 135, by Williamson.
Nasiœschna pentacantha, Rambur. One male, Go Home Bay, Ont., July 16. Also one half-grown nymph from the same locality and several full-grown ones from Bala, Ont., Aug. 28, 1906, (W. H. Fraser). New to Canada.
Didymops transversa, Say. Ottawa, July 14, '99, (Gibson).
Neurocordulia yamaskanensis, Prov. Go Home Bay. Nymphs and perfect insects. June 28 to July 23, (Walker). New to Ontario.
Cordulia shurtleffi, Scud. Nepigon, July 1, '88, (Fletcher). Go Home Bay, July, (Walker). Toronto, June 9, (W. J. Fraser).
Tetragoneuria cynosura semiaquea, Burm. Ottawa, May 31, '99, (Gibson).
Somatochlora forcipata, Scud. Rigaud, Que. (Rev. J. E. Desrochers). Also recorded from Newfoundland by Williamson.
Somatochlora minor, Calvert. Fort William, Ont. Aug. 26, (Walker). New to Canada.
Somatochlora albicincta, Burm. Nepigon, Aug. 30, (Walker). New to Ontario.
Nannothemis bella, Uhler. Go Home Bay. Abundant locally, on floating sphagnum bogs, June 28 to Aug. 1, (Walker).
Leucorhinia proxima, Calvert. Peachland, B.C., July 19, (Wallis).
Sympetrum scoticum, Don. Beaver Lake, Alta., Aug., (Halkett).
Sympetrum obtrusum, Hag. Peachland, July 19, (Wallis).
Libellula incesta, Hag. Go Home Bay, July 15, (Walker).
Libellula exusta, Say. Meach Lake, July 21, (Gibson).

Diptera.

(Arranged according to a Catalogue of North American Diptera by J. M. Aldrich. Smithsonian Misc. Coll. XLVI, No. 1,144. The numbers refer to the pages of the catalogue.)

Aëdes quaylei, D. and K. Nanoose Bay, Vancouver Island, B.C., Aug. 1, (Fletcher).
Aëdes spenceri, Theob. Regina, (Willing).
Culiseta inornatus, Will. Carnduff, Sask., (Willing).
138. *Pelorempis americana*, John. Vancouver, B.C., April 22, (Harvey).
153. *Lasioptera corni*, Felt. Guelph, Muskoka and London, (Jarvis).

155. *Dasyneura canadensis*, Felt. Ottawa, reared from the cones of White Spruce, (Fletcher).
Cecidomyia ulmi, Beuten. Guelph, from *Ulmus americana*, (Jarvis).
Hormomyia cratægifolia, Felt. Guelph, on leaves of *Cratægus*, (Jarvis).
169. *Simulium fulvum*, Coq. Lake Louise, Laggan, Aug. 3, (Skinner and Fletcher).
193. *Pangonia fera*, Will. Crown Mountain, Vancouver, B.C., one male, July 9, (R. S. Sherman).
206. *Tabanus phœnops*, O.S. Vancouver, July, a male, (Sherman).
223. *Spogostylum melanopogon*, Big. Crown Mount, Vancouver, July 9, (Harvey). The only locality given in Prof. Aldrich's catalogue is "North America."
241. *Eclimus auratus*, Will. Vancouver, July 25, (Harvey).
272. *Laphria pubescens*, Will. Vancouver, July 25, (Harvey).
401. *Pocota grandis*, Will. Vancouver, July, (Sherman).
418. *Cuterebra frontinella*, Clark. Guelph, larva from neck of kitten, (Jarvis); Almonte, Ont. larva from chipmunk, *Tamias striatus*, (J. K. Darling). The fly emerged at Ottawa in June, (J. F.).
419. *Cuterebra grisea*, Coq. Aweme, (Criddle); Saskatoon, Sask., July 21, (Willing); Norden, Alta., July, (W. Dover).
423. *Alophora magnapennis*, Johnson. One specimen of this grand tachinid was taken at Ottawa by Mr. Harrington. The original type was collected at Montreal by Mr. G. Chagnon. It is easily recognized by its conspicuously large and boldly blotched wings.
449. *Belvosia bifasciata*, Fab. Tessier, Sask. July 20, (Fletcher).
647. *Agromyza æneiventris*, Fallen. Guelph and Muskoka district, on stems of *Populus tremuloides*, (Jarvis).
648. *Agromyza magnicornis*, Loew. Guelph, on leaves of *Iris versicolor*, (Jarvis).

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